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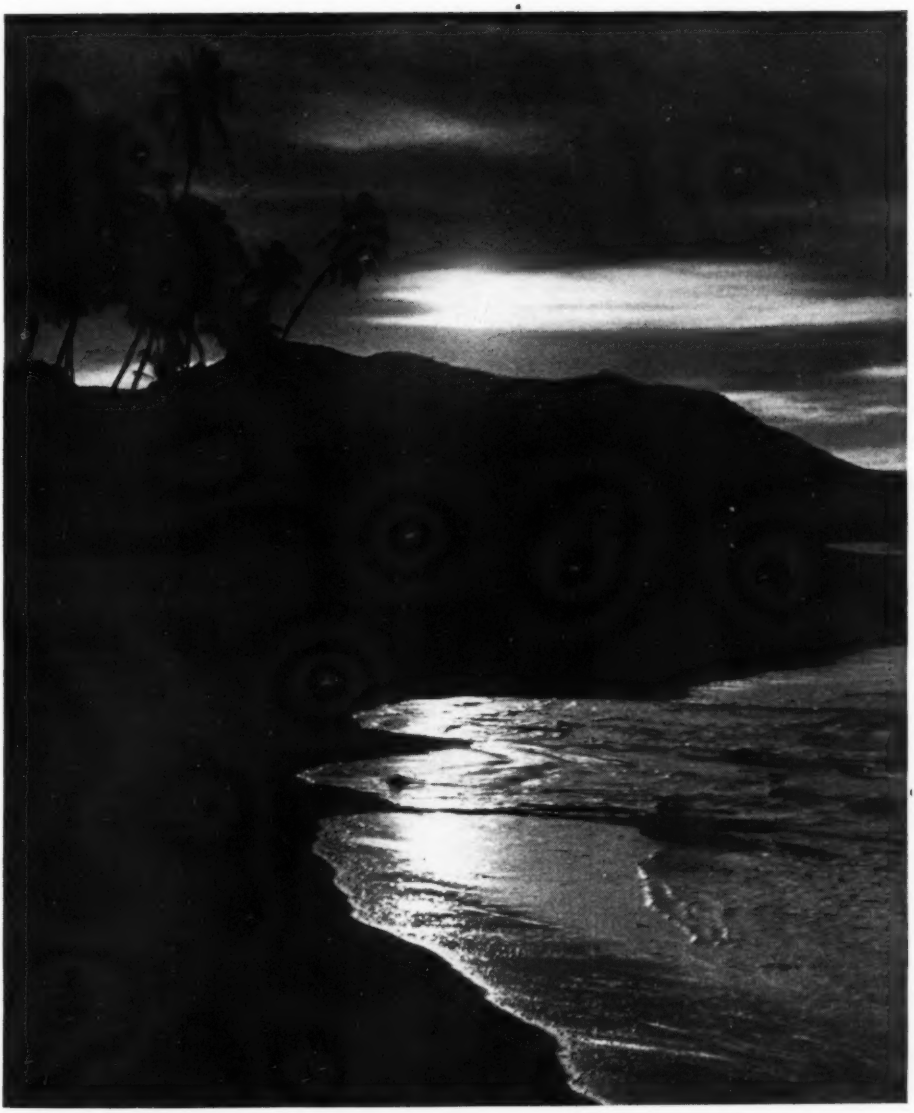

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INVESTMENT BUILDING **WASHINGTON, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*
Editorial Office: Investment Bldg., Washington, D. C.

VOLUME XXII NUMBER ONE

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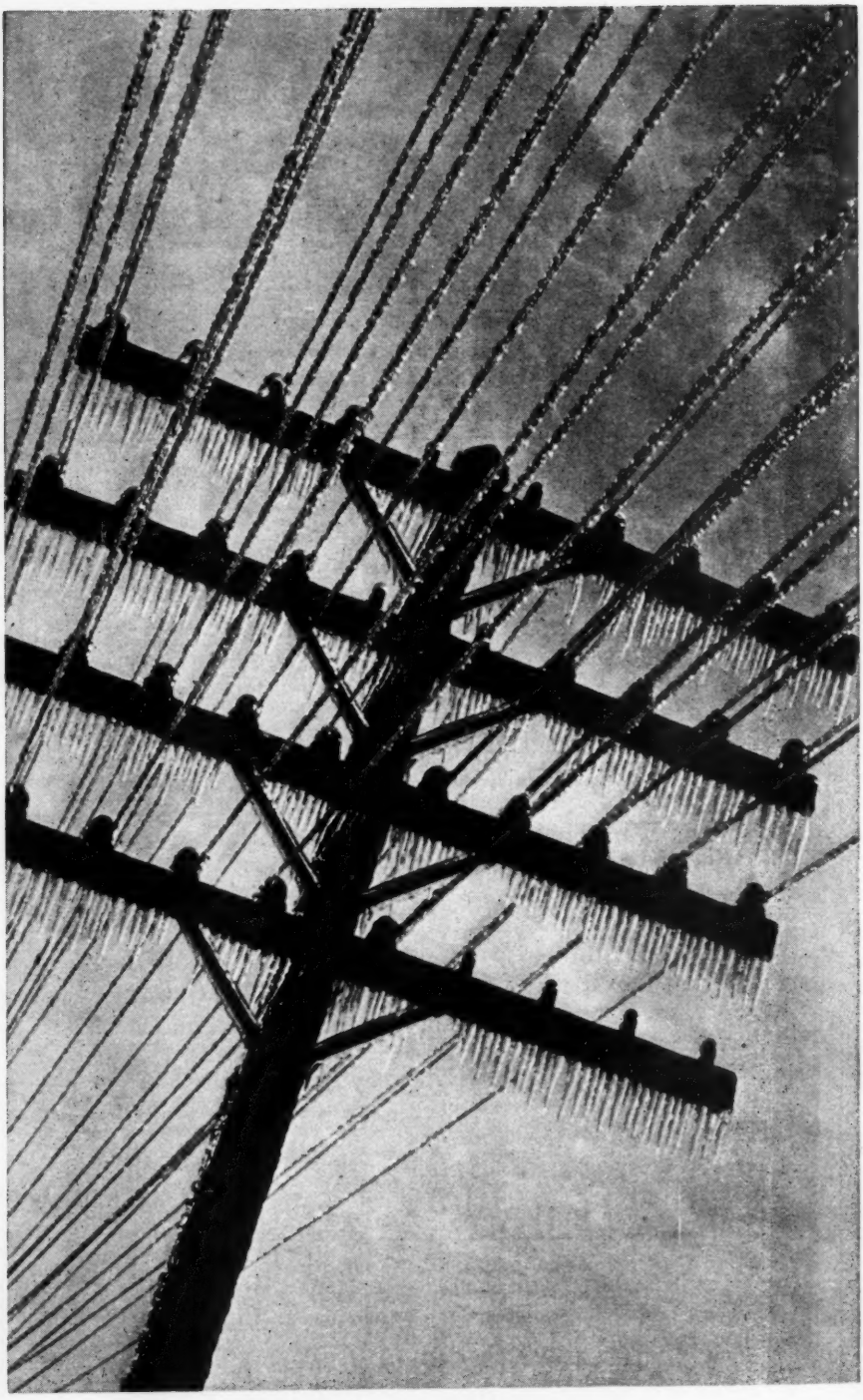

SEASON'S STYLE NOTE: WHITE FRINGE AND CRYSTAL BEADS

Better Crops with PLANT FOOD

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VOL. XXII WASHINGTON, D. C., JANUARY 1938 No. 1

Jeff stalks old frontiers for—

Hunch Hunters

Jeff McDermid

WE COME once more to the annual overture period, when young folks make commendable resolutions and the rest of us smile in retrospect and wish we had the gumption to do likewise. I presume the ones who take least notice of this seasonal burst of ambition are really those who are naturally so full of brilliant ideas and productive energy that they need no signal to start them on the course.

Discovery and conquest of any new frontier, whether by physical toil and deprivation or studious thinking and marvelous ingenuity, have but one logical objective. This objective is to fill human wants and to have the mass of people able to acquire and use that new force, that new luxury, or that new knowledge. Those who produce must ever consider the plight of those who consume, which ought to promote both selfishness and unselfishness in delightful balance.

Today the materialistic planner and the scientific promoter of this machine-power age are about to join forces in a finer way with their brethren of the "lesser sciences," the dreamers and hopers of sociology, philosophy, and economics, not only to discover new frontiers but to make those frontiers practical, useful, and habitable. Their desire is to end the paradox of living in an era of marvels without means to end misery; of dwelling near a bulging granary on

half rations; and of having prosperity halted because we can't afford to pay for it. We have found that commercialism does best with a mixture of altruism. We must prove that plenty can prevail without sacrifice of production or profits.

WE have tried hard to attain a fuller life in America, first by bold individualism, and later by persistent pressure groups when individual effort lagged. Neither has sufficed to meet our needs completely, albeit we have corrected some glaring errors and solved some tremendous problems. Perhaps with a little reflective review we may come closer to the reason for some of our frustration.

We may set down some axioms which have proven historically true. First, the man who wants least in the world is usually of the least consequence and will perform the least for mankind. To be satisfied may mean stagnation.

Each age discovers things according to its lights, and no doubt the Indians who invented arrowheads, canoes, wigwams, and stone implements served their generation well. The early whites had relatively few wants beyond meager subsistence, but they refined the savage tools into iron plows, spinning wheels, dash churns, and candle molds. After the fall of Rome and up to the eighteenth century, feudalism and slavery hatched few worthwhile inventions. On a ruined Roman bath-pipe men found raised letters and characters, yet no Roman got the idea to put ink on them for printing. In colonial America our fathers had wood handicraft mostly, which gave way to keen New England invention when tariffs, transportation, and internal improvements got under way. Demand plus practical utility spurs the onward march of progress, with the masses looking to the individual for leadership.

Inventors are reformers too, and sometimes that hurts somebody, except in the field of social betterment, where folks like Peter Cooper of Cooper Union, Jane Addams of Hull House, and Booker T. Washington of Tuskegee stand forth like beacons to urge the union of mind and heart.

Second, personal creative selfishness and pride in achievement have been the means of the greatest discoveries and are a living proof that brilliant and talented leadership finds the road to new civilizations and expanding opportunity. Witness that the patent system as we use it today grew out of the English statute of monopolies of 1623, and in itself fosters a kind of monopoly under limits and restrictions. True, some of our broad-minded scientists, chiefly in agriculture and medicine, have rejected all pretense at monopoly themselves, but their unselfishness has not always been imitated by those who later on developed their original discoveries.

RELIABLE sources say that the chief industrial lands of the world with patent systems have accumulated some 5,000,000 separate ideas in their archives, of which our own blessed Yankee-land has stacked up fully 2,000,000 alone. It doesn't matter how many are unworkable or not ready to spring on the populace. In this country the palm for patents belongs to the little State of Connecticut, with a high record of one patent for every 700 citizens and an average of one to 1,000 citizens, against one to 3,000 for the average State.

Maybe it began when wooden nutmegs sold so well. But we think the reason for Yankee inventiveness is their descent from the middle class British who led the industrial revolution. There were no vast plantations there and landed gentry were few, water power was abundant and small factories the rule. Clocks by Eli Terry and Seth Thomas; Ed Pattison

of Berlin and his original tinware peddlers; Elisha Root, the farm boy genius, some of whose intricate turret lathes and drop hammers are working today; David Bushnell, first submarine maker in the Revolution; John Fitch,

whose first steamboat went 20 miles an hour on the Delaware in 1790; Charles Goodyear, pioneer caoutchouc or gum elastic student, who found a way to make rubber goods more useful by vulcanization. Then from the genius and energy of Connecticut came the great inventors and designers of firearms, notably Christian Sharps and his first breech-loader, followed by Daniel Marlin, Horace Smith and David Wesson.

Third, invention and discovery feed upon themselves and breed more new ideas and wider opportunities.

TWO early movements which illustrate this tendency are found in the development of interchangeable parts on the one hand and specialized machine tools on the other. To cheapen the cost of manufacture of arms, Eli Whitney and Simeon North of Connecticut learned to standardize machine tool parts by means of "jigs" or devices to shape parts equally so they would fit anywhere. Afterwards this system was used with clocks and watches. It meant that old handicraft was giving away to speedier and lower cost production, which in turn enabled poor folks to buy the new inventions. It also spelled the rise of such huge armories as Col. Sam Colt erected at New Haven, and paved the way for the bicycle, camera, farm implement, and automobile.

Machine tools invented by the eastern wizards grew into vast and intricate webs of mechanical marvels, including bevel gear cutters, multiple spindle lathes, bolt headers, thread rollers, die cutters, power looms, and stamping machines. Without the use of machine tools we would not have today any generated light and power, rapid transportation, agricultural equipment, and the processes of printing, textile making, and laboratory science.

SIMILARLY rural-minded genius was not asleep while all these industrial waves were rising, for on the borders of the factory zones lay the ambitious farmers who also desire to lessen their labor and enhance their profits. Notably in Cayuga County, New York, there seems to have arisen a flock of active minded gentry, eager to serve the husbandman by means of interchangeable parts and machine-tool craftsmanship.

In 1885 a student of that county wrote in tribute to the enterprise of his fellow citizens that since the patent act of 1836 there had been 475 patent rights granted there. The leading devices on which their time was spent were harvesters, carriage axles, plows, knife grinders, clothes wringers, threshing machinery, and stump pullers. W. A. Kirby brought forth a reaper of some prominence; Avery Babbit invented a new carpet loom; and finally the chief of them all, Cyrenus Wheeler, made and sold thousands of the famous line of Cayuga Chief rakes, reapers, and mowers.

Combinations of brains and talent worked wonders. In 1842 Ezra Cor-

nell, father of the great college of farm fame, was solicitor and agent for a plow factory in Connecticut. One day in his call on a farm paper editor in Maine, he found that worthy trying to explain his idea of a new dirt scraper to a manufacturer. The editor had secured the contract for laying the pipe to hold the first telegraph line from Washington to Baltimore, so that the wonderful scheme of the young artist, Samuel F. B. Morse, might be given its initial test. After a scornful survey of the scraper on paper, Cornell informed the editor-contractor that he would guarantee to design a machine to open the ground, deposit the pipe, and cover it over in one job with yokes of oxen. Within 10 days Ezra had perfected his idea and had laid a hundred feet of piping all buried nicely in regulation fashion in less than twenty minutes. Somehow Morse's plan failed to work well despite this zeal, and it was Cornell who saved the day finally by erecting poles with wire fastened to them, well insulated.

EVER since Columbus' day and age one bright hunch has led to others. You remember that prior to the Italian's vision of a new world to be won by sailing west, Toscanelli, the astronomer, had stated his firm belief that the world was round, and the travels of Maffeo and Nicolo Polo and the latter's son, Marco, fired the imagination of Columbus with tales of the Tartar kings.

Likewise in our subsequent history of invention hundreds of cases arise where a new lead opens the trail to a wonderland of treasures. In all cases, of course, the need of humanity is there to spur onward the zealot in his independent conquests. Two outstanding examples besides the automobile and the radio establish this truth in history—the sewing machine and the piano. After Elias Howe, eccentric Civil War hero and Massachusetts inventor, perfected the first sewing machine, others came to "infringe" upon him or to go him one better in pleasing the seamstress. Isaac M. Singer, one-time concert hall and theatrical manager, seized upon such a chance and made good. Other additional patents were added by Grover & Baker, Wheeler & Wilson, and Wilcox & Gibbs, all for the benefit of the masses in making home garments and improving factory output.

TAKING the commonplace piano on which our youngsters practice with such martyrdom, it too shows the prolific spirit of repeated invention and improvement, all to find quicker response from music lovers. The piano, as such, originated with Cristofali of Florence in 1710, but long before it arrived succeeding musicians had done their best with the muse on the cithara, psaltery, dulcimer, clavichord, spinet, and harpsichord, pointing to each as the last word in excellence. After Cristofali passed away, the genius of later years kept on, and under the magic of Sebastian Erard, John Broadwood, and Jonas Chickering, the piano as we know it today slowly emerged from the brain and work bench.

And no case of this order is complete without the names of airship planners and perfectors, such as the Wright Brothers and Curtiss, or the brilliance of Ford and Ketterling in the motor field. And who could mention a word of invention and superpower appliances and omit the names of Edison and his co-worker, Frank Sprague? It only multiplies the case for self-confidence, a sort of superselfishness, and the hot scent of those bent on further creations to satisfy humanity.

We see how the simpler tools of the middle ages enabled men to make a start in creative effort once the industrial revolt began in earnest. In those early days men had ships, forges, gears, belts and pulleys, gun powder, bal-

(*Turn to page* 47)

Raising Pure-bred Seed For the South

By A. B. Bryan

Editor, Agricultural Extension Service, Clemson, South Carolina

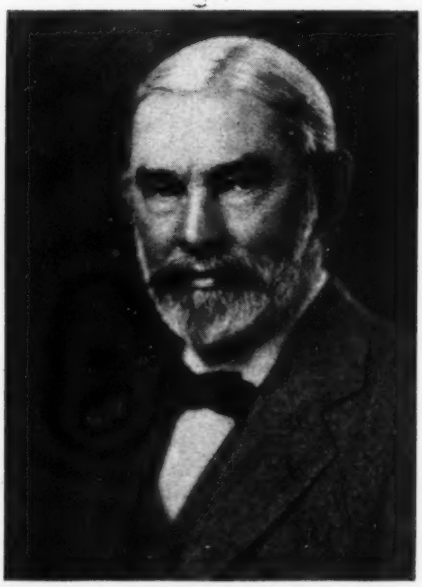
ON GOOD soil properly handled, with well-bred seed and intelligent methods of fertilization and cultivation, hundreds of farmers in South Carolina and other Southern States make one to two bales of high-quality cotton per acre, 800 to 1,200 pounds of superior tobacco per acre, 30 to 60 bushels of excellent oats per acre, and so on. Such yields mean profits to the growers and a basis for permanent agriculture.

Yet farming in the South as generally practiced has not been profitable and prosperous, and there has been a long-felt need to bolster this section's agriculture in any and every way that will give it a greater stability. As for the South's principal cash crop, cotton, especially in the eastern half of the Cotton Belt, it has become more evident in recent years that high-quality lint at low cost per pound is the only solution. The Southeastern farmer who produces less than a half bale per acre of good lint is now a hopeless misfit.

The plight of the agricultural South, as analyzed by various leaders in farming and business, is the result of various factors, economic, social, and personal. Without attempting a scientific analysis of these factors, some of the elements of the situation may be enumerated here.

The South depends too largely on its two big money crops, cotton and tobacco, for its cash income.

It sends away too much of its cash for foods and feeds, much of which could be produced at home to advantage.



David Robert Coker, master mind of Coker's Pedigreed Seed Company.

It has let too much of its soil wash away through erosion.

It plants too many acres of land which will not produce profitable yields—acres which should go back into trees.

Its cropping system suffers from lack of rotation and cover crops.

It pays too little attention to production of high yields per acre for lower unit cost, and to superior

quality of products for higher market value.

It heeds too little what is known of the scientific facts and methods of production, processing, and marketing.

It does not take full advantage of its climatic conditions favoring double cropping, intercropping, and winter farming for soil building and for market.

It has not developed livestock farming to go hand in hand with crop farming, for home consumption, soil improvement, and supplementary cash.

For Better Farming

Steps leading up to a higher plane of farming are, of course, statesmanlike leadership toward intelligent farming policies, wiser land-use planning and practices, purebred seed and livestock as fundamental to better yields and higher quality products, and improved methods based on scientific facts and experience.

Let's hear the words of competent authorities directing the way out.

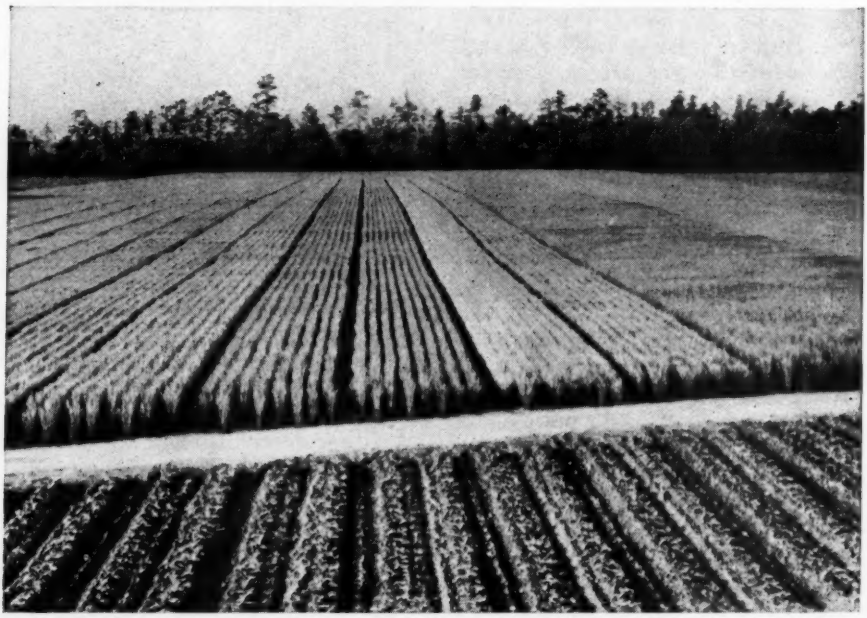
"A sound and continuing national policy on agriculture is necessary to promote the general welfare as well as the security of millions of farm people," says Director D. W. Watkins of South Carolina's Agricultural Extension Service.

"Proper preparation of soil, correct cultivation, adequate fertilization, and high quality seed are certain to bring to farmers the greatest reward for their efforts," says a successful scientific and practical farmer in South Carolina.

"I believe that the use of scrub seeds causes perhaps a greater loss to the farmer than any other single factor in production. The cost of producing a crop is practically the same whether purebred seed of high quality or a common run of seed is used," says former Governor Max Gardner of North Carolina.

"The South will be prosperous when all her fields are green in winter," says Hugh MacRae, a North Carolina owner of large holdings who practices his faith and keeps his soil prime.

"We must add animal production



Small grain breeding plots of Coker's Pedigreed Seed Company.

to plant production," says Dr. Clarence Poe, editor of *The Progressive Farmer*, "get adequate profits from producing livestock, dairy and poultry products, as well as crops, and we must add live-at-home farming to money-crop farming."

"I don't believe that much can be done to help the farmer unless he uses the best methods that science and experience have revealed. The universal and regular use of scientifically bred seed for all crops is one of the most important and necessary steps for the restoration of stability of agriculture," says D. R. Coker, a widely known and honored Southern plant breeder and large farmer.

If these things be true and if it be true, as has been said, that "The net profit of the farmer is the raw material of general prosperity," it is fortunate for general prosperity that the South has leaders and agencies that are helping to put into operation these various factors which are raising the plane of Southern farming and rural life.

Personal Patriotism

Among these are, of course, the agricultural colleges, with their researches into the sciences fundamental to agriculture, their resident teaching, and their extension services to carry the gospel of better farming to the remotest citizens. There are, also, leading farmers whose intelligent practices support or supplement the work of the colleges; and there are commercial and private organizations whose patriotism as well as their self-interest lead them to work in the interests of the public.

All of which brings us now to the central theme of this story—namely, the importance of purebred seed in better farming, and the value of the services of an outstanding Southern seed-breeding organization — Coker's Pedigreed Seed Company of Hartsville, South Carolina.

South Carolina and the South are

George J. Wilds, plant-breeding manager of the company.

fortunate, indeed, in having many worthy seed breeders, whose careful scientific labors have been of great value to farming, even though not always successful financially. The same might be said, too, of pioneer livestock breeders whose work has helped farmers to know and appreciate purebred livestock.

Coker's Pedigreed Seed Company, because of its completely scientific organization, its wide range of plant-breeding operations, its long-established status, its large practical-farming demonstrations of its seed-breeding and other good-farming principles, and its far-flung service to Southern agriculture, merits special attention.

First and fundamental in profitable farming anywhere—not forgetting the soil itself—is the need for good seed.

Dr. Seaman A. Knapp, founder of our agricultural demonstration work, once said that the productive power of the average Southern farmer could be increased 50 per cent by better seed. If that seems a rather large increase from better seed, we can at least accept Coker's very modest esti-

mate of 10 per cent increase. He says:

"Our long experience convinces us that if every grower of cotton and grain in the South would adopt a systematic plan of securing purebred seed from scientific sources year by year, his gross farm returns would be improved by at least 10 per cent, *and this 10 per cent would mean not less than twice the net return that most farmers have been realizing.*

Compare Costs

"The average cost per acre of seed for Southern farms is the smallest of any of the indispensable items of crop production. It need not cost more than one dollar per acre for seed of the highest reliability and producing power as against several dollars per acre for each of the other important factors, such as land, preparation, fertilization, harvesting; and yet the difference in cost of only a few cents per acre between the most reliable varieties ot scientific breeding and the average nondescript seed will frequently make a difference between conspicuous success and miserable failure."

These words, it must be kept in mind, are the words of a scientist whose large farming operations bear eloquent practical testimony to the truth of his preaching and whose unselfish service to agriculture and society leave no room for question that he puts service ahead of self.

Messrs. D. R. Coker and J. F. Clyburn inspecting a field of April-planted Coker-100. Final yield, 821 lbs. lint per acre, average staple 1⅛.

For a full generation, since 1902, Coker's Pedigreed Seed Company has served its generation—without any "nature-faking" but on the established principles of breeding—always seeking to sell people on plant breeding rather than trying to sell them seed, and seeking to demonstrate that pedigreed seed will make money for the farmers rather than for the plant breeders.

David Robert Coker, founder of Coker's Pedigreed Seed Company, is the son of the late Major James Lide Coker, in his day a large farmer and

business man whose public-spirited service was conspicuous.

A graduate of the University of South Carolina, with a scientifically trained mind, David Coker has done further honor to the family name and has had shown him by the people such honors and trusts as these: Chairman of the South Carolina Council for Defense, 1917-19; Federal Food Administrator, 1917; member of the National Agricultural Commission to Europe in 1918; director of the Federal Reserve Bank of Richmond; trustee of the University of South Carolina.

An Idea Materializes

Coker's interest in plant breeding began in 1902 when his attention was attracted to the cotton breeding work carried on by Dr. H. J. Webber of the Bureau of Plant Industry, United States Department of Agriculture, who had started a series of breeding tests in 1898 to improve the staple and quality of upland cottons. With seeds which came originally from selected plants of short staple cotton on the Hartsville plantation, Mr. Coker began breeding on his own account. He used from the first the scientifically accurate plant-to-row method of testing. This method, while fundamentally simple and approved by all authorities, requires unremitting labor, endless patience, and expert knowledge of cottons on the part of the breeder who uses it.

In its essentials, the plant-to-row method of selection merely assists Nature in propagating those plants exhibiting the traits which the breeder wishes to transmit to the plant's product. In the case of his cottons, it was Mr. Coker's task to select season after season from his breeding fields those plants which bore lint of the greatest length and best quality and which had other visible characters of unusual merit. The seed from such selected plants were planted the following season in a row to themselves, the uniformity, vitality, and earliness observed, and the comparative yields accurately determined. The lint produced by each row was carefully tested and the degree in which each selected plant possessed the ability to transmit to its offspring those desirable qualities which had led to its selection, in the first instance, determined whether its progeny should be selected for increase.

In 1914 Mr. Coker and his associates formed Coker's Pedigreed Seed Company at Hartsville, South Carolina. This company has continued the momentous work for the staple cotton industry and has extended its activities to include plant breeding with tobacco, grains, asparagus, cantaloupes, watermelons, etc. It now includes also dairy cattle breeding and extensive practical-farming operations. For a period of years the company had, as the valuable director of its plant breeding, Dr. H. J. Webber, whose ideals and example first stimulated David Coker and led to the establishment of the business.

Steady Progress

As years have passed, the work of the Pedigreed Seed Company has made steady progress in extending its service over many States, though there have been times when operations were at heavy financial loss and many thousands of extra capital were necessary to maintain the ideal and the service. Meanwhile the organization has of necessity grown until it has a large staff of scientific and business workers, with David R. Coker the directing head, and George J. Wilds, a thoroughly trained and experienced scientist, as plant-breeding manager.

The value of plant breeding, not too well appreciated by most people, may be stated thus:

The recognition, propagation, and utilization of valuable plant variations bear exactly the same relation to profitable plant production that the recog-

(*Turn to page* 43)

Commercial Fertilizers In Grape Growing

By F. E. Gladwin

Vineyard Laboratory, New York Agricultural Experiment Station, Fredonia, New York

IN 1909 the New York Agricultural Experiment Station began testing the three principal elements of plant food, nitrogen, phosphorus, and potassium, in their relationships to Concord grape production on a 30-acre farm located in the heart of the Chautauqua and Lake Erie Grape Belt. Three distinct soil types are represented in the area, namely, Dunkirk gravelly loam, Dunkirk silt loam, and Dunkirk shale loam.

The experiment about to be discussed is located on the Dunkirk gravelly loam. Chemical analyses of the soil are shown in Table I. Both the surface 7 inches and the subsoil to a depth of 14 inches show an abundance of potassium. The phosphorus content of both the surface and subsoil is low. The nitrogen sampled from both strata is likewise low, there being about twice as much in the surface soil as in the subsoil. If soil analyses alone could solve the fertility problem, it would seem that it would only be necessary to apply nitrogen to these vines to secure a pronounced response, but as will be shown later, more than chemical analyses are necessary to evaluate the soil needs in commercial practice.

The vineyard chosen for this particular test had been planted about 18 years when the experiment started, and the vines therein had been subject to the same care that commercial vineyards in the section were receiving. Rather close examination showed that they were nearly normal vines for this soil type. Approximately a third of the vineyards in the Lake Erie Valley are on soils very similar to this on which the test was made. It is considered an outstanding soil for grapes because of its depth, its texture, and the good drainage which permits it to be tilled within a few hours after a heavy rain. Since this type of soil is easy to cultivate and because but little farm manure is made in the region, the amount of humus has been reduced to much below the requirements for optimum vine growth and production.

Humus Depleted

The use of green manures in the region was the exception. The reduction of humus has been going on year after year for a long period, and it has required many years of this experiment to put back an amount anywhere near proportional to that which had been removed. It is believed, however, that the humus content is now at the point where commercial applications of nitrogen, phosphorus, and potassium will be even more effective than the figures herein presented show. Since no manure nor commercial fertilizers had been applied to these vines for at least 10 years previous to the beginning of the experiment, there could have been no accumulation of plant-food reserves in the soil.

The area allotted to the test was divided into 11 plats, each consisting of from 111 to 114 vines, all Con-

cord. Each plat was separated from every other by a buffer row of vines. Five fertilizer treatments were made namely, nitrogen, phosphorus, potassium, and lime every third year; nitrogen, phosphorus, and potassium; nitrogen and phosphorus; nitrogen and potassium; and phosphorus and potassium. These plats were duplicated. In the exact center of the area the check or control plat was located. This also included about 111 vines.

The source of nitrogen for most of the 25-year period has been from nitrate of soda, which was applied at the rate of 250 lbs. per acre annually. Phosphorus was derived from superphosphate carrying 16 per cent phosphoric acid. Three hundred pounds of it have been the annual acre application. The potassium was carried in muriate of potash which was put on at the rate of 200 lbs. to the acre. The superphosphate and muriate of potash were broadcast over the surface of the soil in early spring and either disked or plowed in the soil as deeply as the grape roots would permit. The nitrate of soda was applied shortly after the buds began to break. Green manures, principally rye, have been sown annually in late July, and either disked or plowed under the following spring when they had attained a height of approximately 2 feet.

The tillage given these vines has been no different than that given to thousands of acres of grapes in this region. The number of cultivations has depended on the frequency of rainfall as it influenced weed growth. Hence for about 2 months of each year the soil under the trellis wires and between the rows has been practically free from weed growths.

In gauging the results in these tests, the effects on quantity and quality of the fruit should receive first consideration. Next in importance are the relationships between the treatments and growth of leaf and cane. Other possible effects have been looked for from time to time. During a period of 25 years many extremes of weather have been experienced, as hot and dry summers, followed by those cold and wet. Winters with mild temperatures and little snow cover have followed those with extreme low temperatures and heavy snowfall. The relationship be-

This plat received applications of nitrogen, phosphorus, and potash and averaged 61 per cent more grapes than the check.

tween fertilizers, if any, and their effect on fruit and cane maturity, and the effect of the different food elements on resistance to winter cold have received attention. Have any of the materials affected the time of leaf fall or that of foliation in the spring? The sugar-acid ratio of the grape has a most important bearing on the palatability of the fruit, either when eaten fresh or when taken as a beverage. These studies have hence included any possible relationship between the sugar content of the grape and any of the treatments.

The recorded data for fruit yields show that the vines fertilized with nitrogen, phosphorus, and potassium, with a lime application every third year, have averaged 50 per cent more grapes than the check; the nitrogen, phosphorus, potassium plats 61 per cent more; the nitrogen and phosphorus plats 43 per cent more; the nitrogen and potassium plats 57 per cent more: while the phosphorus and potassium plats were 27 per cent greater. Since the check plat yielded a total of 53 tons of fruit per acre during the life of the experiment, an increase of 27 per cent is an important gain — if the cost of obtaining it was not too great. All treatments that include nitrogen have averaged 53 per cent greater yields for the period than the check, and 26 per cent more than the phosphorus and potassium combination.

TABLE I. Chemical Analysis of the Dunkirk Gravelly Loam Soil Upon Which This Experiment Is located.

Depth of Sampling in Inches	Pounds per acre								
	K_2O	K.	P_2O_5	P.	CaO	Ca.	MgO	Mg.	N.
0-7	44,600	36,800	3,940	1,720	12,800	9,000	16,200	9,600	3,200
7-14	47,400	39,200	2,860	1,240	14,400	10,200	18,400	11,000	1,700

During the first 15 years of the experiment the fruit from each plat and the pruned canes therefrom were weighed collectively. For the last 10 of the 25 years, the weights of both fruit and wood have been recorded from each vine of each plat.

Compactness, size of cluster, size of berry, and general appearance of the fruit are all important characters in the marketing of grapes to the best advantage. The first three of these are also reflected in the poundage produced, but general appearance or attractiveness is not subject to mathematical determination.

Irrespective of injury from cold, high yield with the grape in any year is likely to be followed by a medium or low return the following one. Conversely, low yields are often followed by high ones if growing conditions are at all favorable. In 9 of the 25 years of this experiment, yields and growth were affected adversely by unfavorable weather. Hence any beneficial effects that might have come from the fertilizers were nullified in the seasons following, so far as fruit yields were concerned.

Results With Potash

Potassium has been of greater value when combined with nitrogen than has phosphorus. When the increase of 61 per cent for the nitrogen, phosphorus, and potassium plats is compared with that of 57 per cent for the nitrogen-potassium plats, phosphorus does not seem particularly effective, at least so far as fruit production is concerned. The role of phosphorus is further lowered when it is noted that the nitrogen-potassium plats averaged 14 per cent greater yields than the nitrogen-phosphorus plats.

The highest quality fruit came from those plats that had nitrogen either in combination with phosphorus or potassium or both. Next in the scale was the fruit from the phosphorus-

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Peanuts Win Their Sit-down Strike

By P. H. DeHart

Agricultural Experiment Station, Blacksburg, Virginia

THE peanut was introduced into the United States during early days of colonization, but did not become of commercial importance as a farm crop until after 1870. Peanuts are at present an important money crop in at least eight southern States, especially in those regions infested by the cotton boll-weevil. The total production in the United States has increased from about one-half billion pounds in 1909 to almost a billion and a quarter pounds in recent years. The average yield per acre for the United States is approximately 700 pounds of farmers stock peanuts per acre. In the Virginia-North Carolina area where the large type peanuts are grown, the average yield is around 1,000 pounds per acre.

The peanut, sometimes called "goober" or "goober pea," is a pea rather than a nut, differing from other plants of the pea family by blooming above ground and maturing its fruit or pod beneath the surface of the soil. The flowers are produced at the joints where the leaves are attached to the stems, and as soon as pollination takes place, the "peg" elongates and goes into the ground, where the pod develops. Due to this habit of growth it is essential that the crop be produced on a soil where a loose surface can be maintained.

The peanut crop was treated as an orphan child on the peanut farms for many years. The opinion of the grower was that, if the other crops in the rotation were fertilized, the peanut had some unusual power that would enable it to thrive on the nutrients left by the other crops. The peanut accepted this treatment for many years, but with the establishment of the principle of equality and the realization of the needs of the "forgotten man," the peanut challenged the constitutionality of the maltreatment of the past and pulled a "sit down strike" on yields, with a request to be given a fair and equal part of the fertilizers used on the farm. In order to settle the "strike" on many farms at present and to prevent it from spreading to other farms, evidence and "pleas" for a favorable decision will be given herewith.

Consider All Angles

In order to present this case, it will be necessary to consider it from the standpoint of the soil, the farming system, plant-food removal of the crops grown in the rotation, and the response the peanut made when a few farmers and experiment station men recognized the needs of the "forgotten man" and broke all customs of the past by taking the peanut off a starvation diet and placing it on a balanced and abundant ration.

The soil should be the first thing to consider when determining the fertilizer needs of any crop, because the soil is the store-house of the raw materials that are used in the processing of crops. If the supply is low, it must be increased by the use of commercial fertilizers and good farming practices, if the processing done

on the farm is to be economical and profitable.

In order to produce peanuts with a bright hull, they must be grown on a sandy or light sandy type of soil. The dark, heavy, and poorly drained soils usually stain the hulls, which is objectionable, and results in a lower price per pound. If peanuts are grown primarily for oil or shelling stock, stained pods are not objectionable. Since the peanut in Virginia must be grown on the sandy type soil, and since the sandy soils of Virginia are marine soils, the majority of the nutrients that are soluble and available to plants have been lost through the thousands of years of leaching and about a hundred years of the cash-crop system of farming that gave little or no consideration to the maintenance of soil fertility.

Soil Deficiencies

A chemical analysis of the Onslow fine sandy loam soil shows it to contain .026 per cent potash and .04 per cent phosphoric acid or a total of 520 pounds of potash and 800 pounds of phosphoric acid in the first 6 inches of the top soil, as compared to 18,200 pounds of K_2O and 3,200 pounds of phosphoric acid in the Hagerstown silt loam in a limestone section. Since a soil is considered deficient in potash when the percentage of K_2O is .25 per cent or less and phosphoric acid .1 per cent or less, the need for liberal applications of fertilizer can easily be seen.

In addition to being naturally low in plant nutrients, the open nature of the soil, large annual precipitation, lack of cover crops, and in general a favorable temperature for bacterial action tend to increase the loss of the more soluble nutrients, such as potash, calcium, and nitrogen, that may have been in the soil or may have been added in the form of fertilizers. The low content of the nutrients of such soils and the climatic and soil conditions that encourage leaching make it necessary to apply heavy applications of fertilizers on all crops of this area in order to insure an abundant supply of plant nutrients in the soil for economical crop production.

TABLE I. Annual Loss of Nutrients by Percolation.

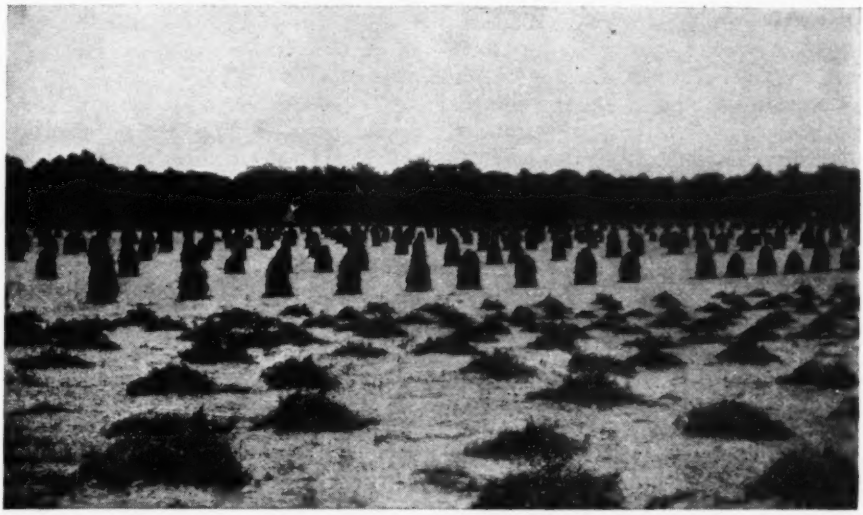
Soil Condition	Pounds per Acre			
	N	P_2O_5	K_2O	CaO
Bare	69.0	Trace	86.8	557.2
Rotation	7.8	Trace	69.1	322.0
Grass	2.5	Trace	74.5	364.0

The actual pounds of nutrients lost per acre from the clay soil given in Table I (from Lyon and Buckman's Nature and Properties of Soils) can not be used to indicate the losses from a sandy soil, because most sandy soils have been leached over such a long period of years that at present they do not contain enough nutrients to permit such a heavy loss. The information in this table will give a good indication of the relative solubility of the nutrients and the loss that may be expected from a sandy soil when the nutrient content has been increased through additions of commercial fertilizers. In fact, the loss would be greater from the sand than from the clay, if both soils contained the same amount of nutrients. One significant point in this table is the reduction in the loss of nitrogen from 69.0 pounds per acre from a bare soil to 2.5 pounds per acre where grass was used, while the loss of potash was only reduced from 86.8 pounds to 74.5 pounds per acre under the same conditions.

The farming system used will materially affect the response from the use of fertilizers on peanuts. If a system of farming has been one that gave little or no consideration to maintaining the organic matter and nutrients by proper rotation, no system of fertilization will give maximum returns. A few farmers have tried to make fertilizers pay in a 1-crop system

of farming, which is about as difficult to do as running an automobile that is out of time. If the above system has been used, the first thing to do is to work out a sound farm management program that includes lime, legumes, green manure crops, rotation of crops, and the use of liberal applications of fertilizers to all crops in the rotation. If the legumes are fertilized, they will make a better growth which will add more organic matter and nitrogen to the soil, and the phosphorus and potash in the fertilizers will assist in correcting the deficiencies of these elements. When a system that included lime, legumes, and crop rotation has been used, the main problem is to use sufficient fertilizers in the rotation to replace the nutrients removed by the crops and that lost through leaching.

The following table calculated from information obtained in Henry and Morrison's "Feeds and Feeding" gives the approximate pounds of a few of the nutrients removed by various crops commonly grown in the peanut belt.



For best results, peanuts require a sandy or light sandy type of soil with plenty of available plant food.

The plant nutrients removed per acre by the crops grown in a rotation of cotton followed by crimson clover as a winter cover crop, second year corn, third year soybeans, and fourth year peanuts may be determined from the figures given in Table II. Since the peanut is a legume, and if the rotation includes at least one legume as a green manure crop, the nitrogen

TABLE II. Plant Nutrient Removal in Pounds per Acre.

Crop	Yield		Nitrogen	P_2O_5	K_2O
Cotton	1	bale	39.5	15.6	15
Corn (grain)	50	bu.	50.0	19.5	11.4
Stover and Cobs	1.7	tons	33	17.2	52.8
Peanuts	1,500	lbs.	59.7	10.2	18.3
Peanut Hay	1	ton	31.0	6	30.2
Peanuts total			80.7	16.2	48.5
Soybeans (seed)	1,200	lbs.	70.8	16.6	29.4
Soybean Hay	2	tons	94.8	23	39.3
Lespedeza	2	tons	85.6	16.5	43.2
Crimson Clover	1½	tons	67.8	13.8	66.9

needs of the peanut will usually be satisfied, and for that reason only phosphorus and potash will be considered. A total of 121.9 pounds of P_2O_5 and 263.3 pounds of K_2O would be removed from 1 acre in 4 years by the crops grown in the above rotation, provided sufficient plant nutrients were present to produce the yields given in the table. The poor yields on the majority of the peanut farms are due to the lack of sufficient nutrients.

Manure Is Insufficient

The information in Table II considered the removal, and in order to arrive at a fertilizer program, it is necessary to consider the nutrients that are returned through crop residue and manure. The use of manure will be of considerable help in reducing the fertilizer needed, but we cannot expect it to supply all of the needs in the peanut belt because of the small number of animal units on the farms and the loss due to improper handling. The following table contains some information on the nutrients recovered from feed in manure and the losses that may be expected.

.5 per cent N, .2 per cent P_2O_5, and .5 per cent K_2O when properly cared for and is worthy of consideration from a plant-food standpoint, but due to the small number of animal units and the rapid loss of the nutrients manure cannot be expected to supply all of the plant-nutrient needs of the peanut.

When this information is condensed into a "Balance Sheet" for plant nutrients, showing the amount removed from the soil and the amount returned through crop residue and manure, the difference between the outgo and income must be made up by the use of commercial fertilizers, if profitable yields are expected to continue.

The amount returned was figured by assuming that 60 per cent of the nutrients in the clover and 50 per cent of the nutrients in corn, soybeans, and peanut hay were returned through crop residue or farm manure.

When it is assumed that the legumes and nitrogenous fertilizers used on other crops in the rotation will supply the nitrogen needs of the peanut, and only phosphorus and potash are considered, we find that 56.8 lbs. of P_2O_5 and 116 lbs. of K_2O must be added in order to balance the outgo from crop removal with the income. When the leaching losses are considered, the amount of potash needed would be much greater. The use of 300 lbs. of 2-12-4 per acre on corn, 600 lbs. of 4-8-6 per acre on cotton at planting, and a side-dressing of 12 lbs. of K_2O would supply sufficient phosphorus to make up the loss, but only 60 lbs. of K_2O would be applied,

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TABLE III. Nutrients Recovered from Feed in Manure and the Loss When Exposed 3 Months.

Nutrients Recovered	Per Cent	Solids	Liquids	Loss When Exposed 3 Mo.
Nitrogen	80.3	35.5	44.8	22.5
Phosphorus ...	73.3	72.3	1.0	35.6
Potash	76	16.7	59.3	51.0

The information in Table III, taken from Hughes & Henson's "Crop Production," is given to bring out the fact that the majority of the potash is recovered in the liquid part of the manure, and 51 per cent of the total potash will be lost when the manure is exposed for 3 months. On the average peanut farm, due to the lack of proper bedding and storage facilities for manure, a greater part of the potash will be lost before the manure is spread on the soil for use by the crop. Manure usually contains about

Ben B. Barber (seated right) talks over with the owner and his family some of the problems involved in feeding a retail milk-route herd near Duluth.

Ben Barber Shaves Cow Costs

By E. R. McIntyre
Madison, Wisconsin

AN independent "free-lance" cow tester named Ben B. Barber, operating in the sparsely settled cut-over-land, pioneer dairy centers in five counties of the well-known Arrowhead region of Minnesota adjacent to Duluth, is probably doing as valuable and constructive service to small herd owners as any regularly organized co-operative dairy herd improvement association in the Northwest. He is rapidly becoming a one-man extension department in all things pertaining to dairy and soil management, and doing a thorough and conscientious job.

Behind the splendid achievement of Mr. Barber in his reasonably priced services to these small farmers lies the zealous interest of George W. Kelley, farm editor of the Duluth News-Tribune, who launched the independent cow-testing unit after it was clear that an association could not be organized in the area on the usual terms, and when there were but two herds in St. Louis county left in active association work. Material for this recital of Barber's busy career comes from Mr. Kelley's first-hand knowledge of conditions there.

It was their idea that a particular type of service at nominal cost without sacrifice of quality, and with much

sustained energy and enthusiasm behind it, was needed to make the system lasting and practical for that section, where newly cleared plots average 25 acres or so. It was believed that the time to start testing was in the pioneer stage of herd building, and not after men grow careless and indifferent to details as their incomes gain. The plan has been highly successful, both to the farmers who pay 90 cents a year per cow enrolled for 6 bi-monthly tests, and also for Mr. Barber who handles 5,000 cows per year at that rate and renders a job equal to many of the best performed elsewhere.

Plans Expansion

Although Barber has been at the work only 2 years, many farmers have him to thank for rapid progress. One small farm up in the State forest area north of Duluth was able to send a son to the State university because the tests and the tester's market service brought the owner $125 to $150 for good proven cows that otherwise might have been grabbed up by a touring jockey for $50 each or less.

Next spring Barber plans to do more things to put thrift money into the jeans of the settlers, especially through the organization of a soil-mapping and fertilizer-consultation service route, which like the present cow-testing service, will be paid for in fees and run along modern, recommended formulas. For this new side-line Barber will take on a specialist who has the recognized qualifications for soil advisory work. At present Barber works alone at a prodigious amount of detail, ably assisted by his wife in keeping books and records and "balancing the barn books" for his 500 scattered membership.

As Barber is his own boss in an administrative sense, (although catering to 500 farm bosses meanwhile) this has meant that certain problems had to be faced and met in regard to the issuing of barn tally sheets and herd books, and in avoiding the payment of costly postage on the return of the latter. (Government-sponsored, official herd books are carried postage free.) The Duluth News-Tribune printed the first set of barn sheets and herd records and furnished Barber with a good camera. The herd books are distributed back and forth through the cooperation of stores, banks, the newspaper office, creameries, and neighbors. Barber gets a lot of publicity and fact-finding letters and pictures galore to his membership through the Duluth newspaper. Last month the 4-H dairy project was celebrated with a vim in Duluth by the community where Barber tests, and the State extension service workers cooperated in the program, in which vocational agriculture teachers have also had a part.

The idea of a free-lance tester is decidedly new to many old hands at the dairy promotion game, but they are admitting it to be a success when handled by men with Barber's energy and ability. This work must not be confused with the mail-order scheme of cooperative testing, a plan which depended on a central testing laboratory and which lacked the vital contacts that the Barber type of dairy leader always provides.

Numerous Duties

Like other good testers, Barber does not stop when he "reads the Babcock fat column." He advises on rations; he sees that the herds of his members are headed with good, pure-bred sires with good production records back of them. He finds a market for the better bulls and a large number of the young heifers. He keeps records on the bulls and their daughters and makes dam-daughter comparisons, watches bacteria counts, and sees that suspicious symptoms in the milk or cream are promptly checked through the local health service. He keeps a wary eye glued to the current feed markets and notifies his patrons of any changes in the prices which may reflect to their advantage.

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Fertilizer Placement Influences Profit

By Lewis P. Watson

North Carolina College of Agriculture, Raleigh, North Carolina

WHEN fertilizer is placed so it will not injure the sprouting seed or the root system of a plant, yet is readily accessible to the feeder roots, stands will be better and yields higher. This was definitely proven to hold true for certain Irish potato growers in North Carolina under the 1937 conditions. In six fertilizer placement demonstrations with Irish potatoes in eastern North Carolina, the fertilizer was placed by the band method to each side and slightly below the seed-piece level. This was done with a fertilizer-placement machine furnished through the cooperation of an implement manufacturing concern. The average increase was at the rate of 15.2 barrels of No. 1's per acre over the check plot, which was fertilized by the old method of placing the fertilizer in the drill and mixing it with the soil before planting the seed.

The six demonstrations were located in Beaufort, Camden, Currituck, and Pitt Counties and were under the supervision of the county agricultural agent in each county. Since proper placement was the point to be emphasized in these demonstrations, no effort was made to get the growers to use a uniform amount and formula of fertilizer. The grower used the amount and mixture which he had found to be most satisfactory for po-

W. L. McGahey, County Agent of Beaufort County, inspects the demonstration plot on the farm of one of his growers. The potatoes in front of him were fertilized according to the old method, those in back of him, by the band method.

tatoes under his conditions. The same fertilizer and the same amount was applied, however, to the demonstration plot and the check plot in each instance.

The plots were an acre in size, and the grower applied the fertilizer to the check plot according to his own practice. This was done by putting the fertilizer out in the drill with a distributor and then mixing it with a plow, followed by bedding. On the demonstration plot the land was flat broke and dragged, leaving the land level. The machine was set to space the rows the same distance as the grower had used on the check plot, and to apply the same amount of fertilizer in 2-inch bands, 2 inches to each side and slightly below the seed piece. The machine planted the seed, placed the fertilizer, and threw up the bed on the demonstration plot in one operation. It was also used to plant the seed on the check plot so that the quantity of seed and the depth of planting would be uniform on the two plots. The fertilizer distributor was disconnected for this operation on the check plot.

Improved Stand

In a majority of the demonstrations and in other fields where placement was practiced, there was a definite improvement in the way the potatoes came up. The stand was more uniform in coming through and was definitely better when the fertilizer was placed to each side and below the seed piece. Where actual counts were made, the stands on the demonstration plots were from 10 to 15 per cent better than on the check. This can be observed in the accompanying photograph of one of the demonstrations in Beaufort County. County Agent McGahey is standing at the dividing line between the two plots. On the rows in front of him the fertilizer was put out by the old method. Behind him the fertilizer was placed as previously described.

The yields were as definitely improved as the stands. On placement plots the yields of No. 1 potatoes were increased from 4.2 barrels on the demonstration in Camden County to 26.4 barrels on one demonstration in Pitt County. The largest yield recorded was in Camden County on the placement plot, where the yield was at the rate of 94.8 barrels of No. 1's per acre. On the check plot 90.6 barrels were produced. The most outstanding increase of the demonstration plot over the check plot was in Pitt County, where the production was at the rate of 52.8 barrels of No. 1's on the check plot and 79.2 barrels of No. 1's on the demonstration plot.

Fertilizers Used

In Camden County, where the highest yield was made, Mr. H. C. Ferebee used 2,200 pounds of 7-5-5 per acre and planted in 3-foot rows. At the County Prison Farm in Pitt County, where the most significant increase was made, the grower used 2,000 pounds of 5-7-5 per acre and also planted in 3-foot rows. The accompanying chart graphically illustrates the results of each demonstration.

The average yield of No. 1's on all the check plots was 58.2 barrels. On the demonstration plots the average yield was 73.4. This is an average increase of 15.2 barrels of No. 1 potatoes. In all cases a barrel was figured at 165 pounds net. This is an exceptional increase, and over a period of years the results probably would not be so significant. But results from other States definitely bear out the fact that with quite a number of crops, yields can be increased by proper placement of fertilizer. In some instances the efficiency of the fertilizer can be doubled if it is applied so as not to injure the root system of the plant and yet be readily available to the feeder roots.

There is a definite, increased interest in fertilizer placement being shown by

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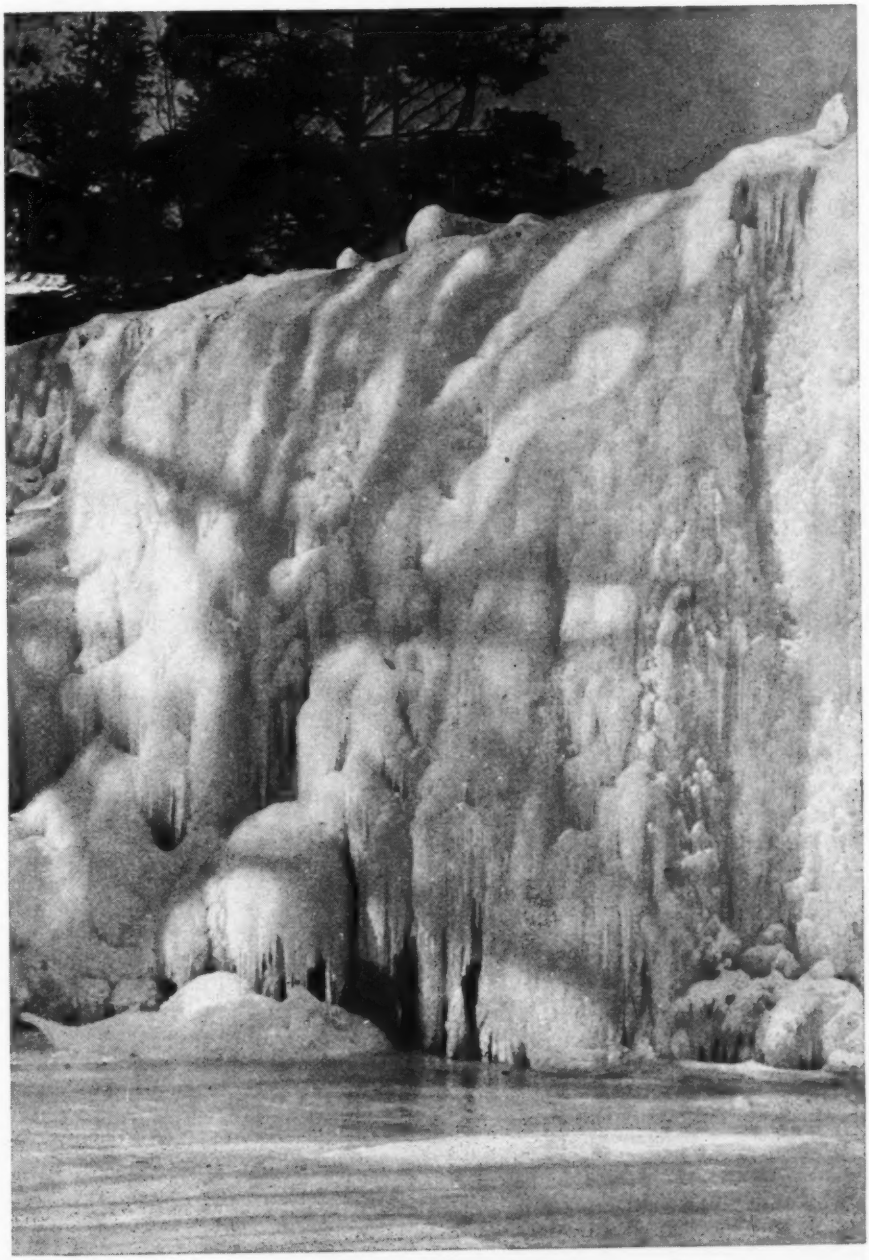
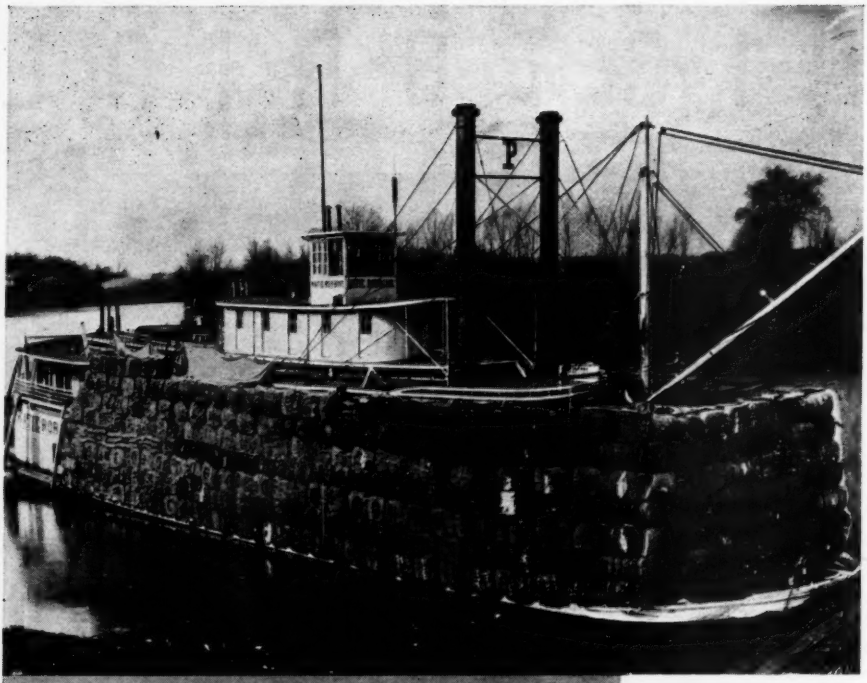
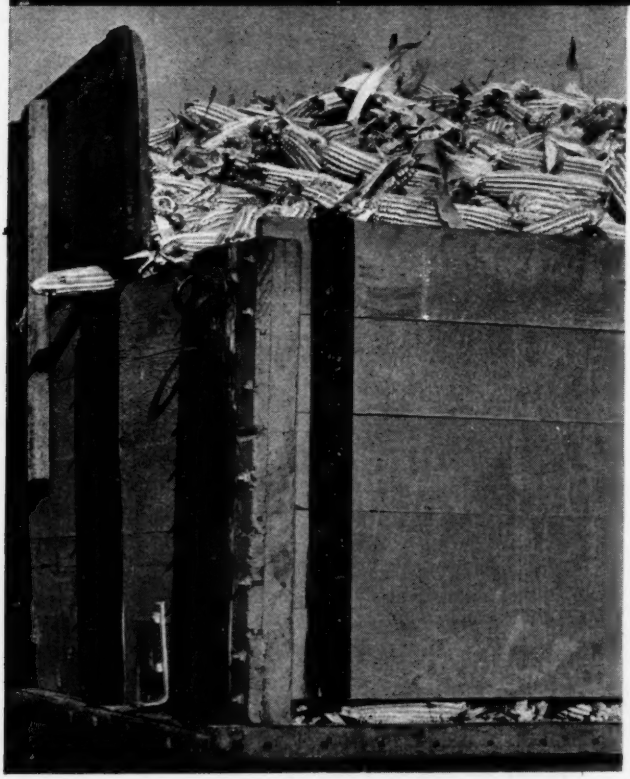
PICTORIAL



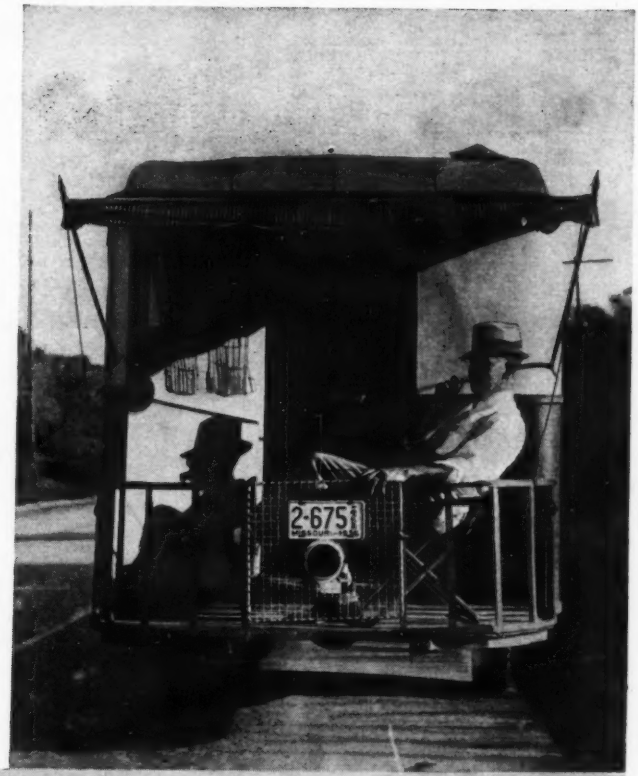
CAUGHT ON THE WAY DOWN.





By water or by land, transportation to market is an important consideration in profit determination.

Whether you're vagabonding or taking your winter vacation seriously, the fewer the rules the better.



Sand or snow, calm or blow, children enjoy life.

The Editors Talk

Looking Ahead

Since it is open season for forecasting, and it appears that nearly everyone is taking advantage of the opportunity, in order to be in the economic swing we are going to dust off our crystal ball and oil up the "if-ometer" with a view to adding our ten cents' worth to the vast pile of economic information. In spite of the fact that it has recently been said by a prominent economist that a pessimist is one who must live with an optimist, we still prefer to be listed under the optimist column.

Our economic mechanism, like an automobile going up a long, hard incline, often finds it necessary to back up and get a better start. It still appears that the present recession in business conditions is of the nature of an automobile backing up to get a better start. The big question is, Will it be necessary to back clear down to the foot of the hill and start over again? There seems to be plenty of evidence at the present time that we have backed about as far as is necessary and are again ready to resume the ascent.

We trust that a slight note of optimism in our opinion will not add materially to the list of confirmed bears. In this connection, it might be suggested to the economic planners that an open season on bears might turn out to be one of the best means of ending our present economic advance to the rear. It appears that most everyone has been convinced by this time that a recession is in order, and that everyone should do his part to help it along. To accurately predict the course of business over the coming year would be to forecast the trend in business psychology and Federal economic programs, two problems for which our outmoded crystal ball and "if-ometer" are not constructed to handle.

Seriously, however, in view of the slowing down in industrial production and its influence on payrolls, it must be expected that the demand for agricultural products will be less during the first half of 1938 than it was last year. Offsetting in part, at least, this decrease in consumer income is the reduction that has taken place in farm prices. This in turn may be construed to mean a big reduction in farm purchasing power. However, when considered in the light of agricultural production during the past season, the net result is a slight increase in the purchasing power of farmers. In November farm income began to show the results of restricted volume of marketings and lower prices and was about 5 per cent under 1936. Although prices paid by farmers receded somewhat from the high levels of last summer, they are still little, if any, under last year. It remains to be seen now if the increased volume of livestock, cotton, and corn to be marketed during the months to come will maintain farm income at levels comparable to last year.

To some extent the prophecies of those who dared to venture an optimistic opinion during the last weeks of 1937 are being realized. The index of production has risen gradually since the first of the year, the rate of activity in

steel mills has increased about 10 points, while prices of some of the so-called sensitive commodities have advanced. Buying has been surprisingly active in textiles, and the retail volume is better than anticipated. The biggest fly in the ointment at the present time seems to be heavy inventories. Encouraged by steadily increasing prices and active trade, purchasing agents bought heavily during the early months of 1937 and built up large supplies of merchandise. During the last quarter of 1937, according to the available statistics, the volume of retail sales was considerably greater than the volume of production. Just how far this condition has gone in reducing inventories is hard to say. However, it certainly cannot be denied that considerable reduction has taken place.

In spite of the many comments to the contrary, we are still of the opinion that business is statistically in a position to continue its upward movement, and while farm income in 1938 may be lower than 1937, it will still be comfortably higher than the depression levels; and while business activities may be less than in 1937, the volume will still be a healthy one. The year 1938 has better than an even break to wind up traveling in the opposite direction to 1937. Anyway, that's what our "if-ometer" says, and for the lack of better information, we'll stick to it.

Agriculture-The Greatest Research

The almost unbelievable number and scope of research projects being conducted by the State agricultural experiment stations with funds and under the general coordinating direction of the U. S. Department of Agriculture are shown by the Report on the Agricultural Experiment Stations, 1936, prepared by the staff of the Office of Experiment Stations, of the Department. Results being obtained in a large number of projects are briefly summarized. Much of the work naturally relates directly to agricultural problems, such as the development of improved varieties of crops, improved fertilization of crops on different soils, disease and pest control of plants and animals, the nutrition and management of farm animals, marketing of agricultural products, improvement in agricultural implements, etc. However, many projects deal with problems which aid the urban as well as the rural population such as food preparation and preservation, nutritional values, nutrition and health of children, energy requirements of women, textile and clothing selection, household equipment, and related subjects. Economic and social problems relating to rural welfare also are investigated. When it is considered that all these projects in the State experiment stations are added to the work directly carried on by the Department, it is not hard to believe the statement frequently made that our national agriculture employs the world's greatest research agencies.

The men whom I have seen succeed have always been cheerful and hopeful, who went about their business with a smile on their faces and took the changes and chances of this mortal life like men.—*Charles Kingsley.*

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ Following the renewed interest in asparagus production some years ago owing to the consumer demand for this vegetable and the introduction of rust-resistant asparagus varieties, Long Island, N. Y., shared a noticeable increase in acreage devoted to this crop along with other important producing areas. Extensive asparagus fertilizer investigations were begun at the Long Island Vegetable Research Farm near Riverhead to aid the growers in determining the most suitable fertilizers for the crop. Based on their nine years' research, P. H. Wessels and H. C. Thompson, in Cornell University (N. Y.) Agricultural Experiment Station Bulletin 678, entitled "Asparagus Fertilizer Experiment on Long Island," give essential information that should particularly benefit producers of this area. The asparagus fertilizer for the Sassafras silt loam soil similar to that found at the experiment farm should supply approximately 100 pounds of nitrogen, 125 pounds of phosphoric acid (P_2O_5), and 160 pounds of potash (K_2O) per acre annually for the first five years. The authors point out that this can be applied by using 2,000 pounds of 5-6-8 per acre. If double-strength mixtures, such as 10-12-16 or similar analyses, are used the amount might be cut in half. After the first five years the quantity of fertilizer could probably be reduced slightly without reducing the yield. Manure for asparagus is not recommended unless it is available at relatively low cost, not to exceed $2 a ton. It is believed, however, that the manure could better be utilized on crops preceding asparagus, applying a complete fertilizer each year to the asparagus bed.

"Fertilizer Rates and Analysis Test—Cotton—Cooperative Tests with Junior Colleges," Agr. Exp. Sta., State College, Miss., Inf. Sheet 122, *Nov.* 1937, *J. R. Ricks, Director.*

"Corn Fertilization—Cooperative Tests with Junior Colleges and Smith-Hughes Instructors," Agr. Exp. Sta., State College, Miss., Inf. Sheet 123, *Nov.* 1937, *J. R. Ricks, Director.*

"Fertilizer Rates and Analysis Tests—Cotton," Agr. Exp. Sta., State College, Miss., Inf. Sheet 124, *Nov.* 1937, *J. R. Ricks, Director.*

"Results of 1937 *Lime, Fertilizer, and Organic Matter Plots on Tomatoes," Agr. Exp. Sta., New Brunswick, N. J., V. A. Tiedjens and L. G. Schermerhorn.*

"Relation of Fertilization and Selling Price to Profitableness in Cotton Production," Agr. Exp. Sta., Raleigh, N. C., Bul, 313, *Nov.* 1937, *C. B. Williams.*

Soils

¶ The use of rapid chemical tests on soils to determine their available nutrient contents, and fertilizer and lime needs has become well established in many places. The tests have earned their position by the helpful and practical information they have given the users, which ultimately benefits the farmer by enabling him to use the fertilizer and lime in the analysis and amount which are likely to produce most profitable results under his own particular conditions. An excellent example of how these tests can be used to advantage, the results they give, and detailed instructions as to making them are given in Virginia

Truck Experiment Station Bulletin 95, entitled "Rapid Chemical Tests for Coastal Plain Soils," by J. B. Hester, J. M. Blume, and F. A. Shelton. The authors show how varying soil and cropping conditions will influence the results of the test, and also their interpretation, an important factor sometimes overlooked.

Results of work on the available supplies of phosphates and potash in the various cropped and virgin soils in the vicinity of Norfolk show that total and available phosphorus is low in nearly all virgin soils, and that fertilization has increased the total but not the available phosphate supply in many cases. Total potash was high in many soils, but the available potash was low in most of them. Very interesting and important relationships between availability of nutrients and fertilizer and lime additions are brought out which should be kept in mind when using these materials. For example, it is shown that as the soil becomes more acid, the availability of the phosphates decreases, due to fixation of the phosphates by the iron and aluminum combining with them under acid conditions. However, if the soil becomes alkaline, or too sweet, the plant cannot seem to utilize the phosphates as well, showing the importance of correct liming, that is, not too much or too little.

Potash is absorbed by most soils to a greater or less extent, and as the potash supply decreases below certain levels, the soil absorbs the potash so tightly that the plant cannot get it. Obviously, enough potash must be applied to take care of the soil's absorbing power and the plant requirements beside, if good results are to be obtained from the fertilization. It is also shown that if calcium or lime is present in large quantities it prevents the plants from taking up potash, even if it is present.

Brief consideration is given to other nutrients, such as nitrates, calcium, magnesium, and also organic matter. The latter part of the bulletin is devoted to a detailed description of conducting the individual soil tests, preparation of reagents, standards, interpretation of readings, and precautions to be observed. Tests for acidity, phosphate, potash, ammonia, magnesium, aluminum, nitrates, manganese, calcium, chlorides, organic matter, and texture are given. A number of literature references on the subject also are included. The bulletin will be of interest to all who are concerned in the testing of soils to determine their lime and fertilizer needs.

¶ Many of the publications of the Soil Conservation Service are notable departures from the usual run of bulletin. Full advantage is taken of the striking facts and conditions existing in various parts of the country to present in a somewhat dramatic fashion their seriousness, and judging from the results obtained this has been effective as well as justified. Three recent publications are good examples of the type issued, namely, "Conserving Corn Belt Soil" by Glenn K. Rule, U. S. Department of Agriculture Farmers' Bulletin No. 1795, "Soil Conservation Districts for Erosion Control," prepared by the Soil Conservation Service, U. S. D. A. Miscellaneous Publication No. 293, and "Erosion Control in the Northeast," also prepared by the service, as an unnumbered publication. All these bulletins contain much practical and thought-provoking information on soil erosion and its control. The remarkably good illustrations not only enhance the messages contained in the text, but add greatly to the attractiveness and attention value of the publications. While they are regional, as implied by their titles, the basic facts they contain will apply over large areas of the country.

"Alkali Soils—Origin, Examination, and Management," Agr. Exp. Sta., Berkeley, Calif., Cir. 292, June 1925 (Revised July 1937), P. L. Hibbard.

"Influence of Crop Rotation and Soil Treatments Upon the Yield of Crops on Porter's Loam Soils," Agr. Exp. Sta., Raleigh, N. C., Bul. 315, Nov. 1937, C. B. Williams, W. H. Rankin, and S. C. Clapp.

"Human and Physical Resources of Tennessee, Chapter VII, Land Utilization, Chapter VIII, Land Drainage," Col. of Agr., Knoxville, Tenn., Monograph 48, June 24, 1937, Charles E. Allred, Samuel W. Atkins, and William E. Hendrix.

"Soil Survey of Southampton County, Virginia," U. S. D. A., Washington, D. C., Series 1933, No. 6, July 1937, R. E. Devereux and Edward Shulkcum.

"Soil Survey of Chatham County, North Carolina," U. S. D. A., Washington, D. C., Series 1933, No. 7, Aug. 1937, R. C. Jurney, J. T. Miller, and S. Rankin Bacon.

"Soil Survey of the Barstow Area, California," U. S. D. A., Washington, D. C., Series 1933, No. 8, Aug. 1937, R. Earl Storie and D. F. Trussell.

"The 1938 Agricultural Conservation Program in the Northeast," U. S. D. A., Washington, D. C., NER Leaf. 201.

Crops

¶ Suggestions to assist farmers in the difficult problem of controlling Fusarium wilt in cotton are given in the 49th Annual Report of the Georgia Experiment Station for the Year 1936-37. The problem is particularly troublesome in the Piedmont, where wilt infestation occurs in small scattered areas, making it impracticable to use wilt-resistant varieties. In these areas, it is recommended that wet portions of the field be drained and muriate of potash up to 100 pounds per acre used. It has been found that these practices will reduce loss from wilt. In the Coastal Plain areas, it is recommended that wilt-resistant varieties be planted and enough potash applied to control cotton rust. In fertilizing cotton under average conditions, it is recommended that 32 pounds each of nitrogen, phosphoric acid, and potash be applied. These amounts may be furnished by the use of 500-600 pounds of 6-6-6 fertilizer, or 400 pounds of 4-8-8 per acre, side-dressed with a nitrogen material to furnish about 16 pounds of nitrogen per acre. The inauguration of new and interesting pasture investigations, breeding work with cotton and other field and horticultural crops, and many other lines of work too numerous to be mentioned here are also described.

¶ Tomato growers, not only in California but in other sections, will find much material of interest and value in California Agricultural Extension Service Circular 104, "The Production of Tomatoes in California," by D. R. Porter and John H. MacGillivray. This comprehensive publication gives information on suitable locations, cropping systems, fertilizers and manures, growing the plants, field operations, staking and pruning, harvesting, varieties, insects and diseases and their control, and in addition other information of more interest to local growers, such as irrigation, etc. In discussing fertilization, the grower is advised to consult with his local agricultural adviser, since the best fertilizer to use will vary considerably with soil and cropping conditions. Proper placement of the fertilizer in the soil with respect to the plant is also discussed briefly.

¶ With the increasing importance being attached to organic matter in orchards, the problem of growing cover crops is constantly arising. The emphasis recently given to soil conservation makes this question all the more important. A good discussion of cover crops is given by N. L. Partridge and Walter Toenjes in Michigan State College Agricultural Experiment Station Circular Bulletin 163 entitled "Annual Cover Crops for Michigan Orchards." Comparative advantages of sod and cultivation, the value and kinds of orchard cover crops, the best time to seed them, their handling to avoid undue competition between the trees, and the cover crop for soil moisture are briefly discussed. In growing cover crops, the authors point out the importance of proper fertilizing if good growth is to be made.

Lime and complete fertilizers are recommended, as needed.

¶ It is coming along to the time of the year when it is pleasant to sit down with those most optimistic and alluring of publications, the seed catalogs, and plan the garden for the coming year. This can be highly profitable as well as pleasant, if the planning is carefully done, and followed up with proper cultural practices. An excellent publication which will greatly aid in producing vegetables approaching the illustrations in the catalogs is Connecticut State College Extension Service Bulletin 242, 4-H Vegetable Gardens, by Garry A. Miles. While written for 4-H Club work, this publication contains much practical information of use to all growing a vegetable garden. Among the subjects covered in the bulletin are, locating the garden, selection of crops and amounts of each to grow, tools, soil preparation and fertilization, early indoor and outdoor planting, transplanting, cultivating, watering, pest control, harvesting, storing, canning, varieties, seeding rates, growing period, and a section on the growing and storing of herbs.

"Experiments with Hay Crops in Alabama," Agr. Exp. Sta., Auburn, Ala., Cir. 79, Oct. 1937, D. G. Sturkie.

"Growing Annual Flowers," Agr. Ext. Serv., Gainesville, Fla., Bul. 92, Oct. 1937, John V. Watkins.

"Cold Storage Studies of Florida Citrus Fruits, III The Relation of Storage Atmosphere to the Keeping Quality of Citrus Fruit in Cold Storage," Agr. Exp. Sta., Gainesville, Fla., Bul. 316, Oct. 1937, Arthur L. Stahl and John C. Cain.

"Forest Planting on Illinois Farms," Agr. Ext. Serv., Urbana, Ill., Cir. 477, Sept. 1937, J. E. Davis.

"Corn Project for 4-H Clubs," Agr. Ext. Serv., Lexington, Ky., Cir. 82 (Revised), Mar. 1937, E. J. Kinney and E. E. Fish.

"Dark-Tobacco Project for 4-H Clubs," Agr. Ext. Serv., Lexington, Ky., Cir. 290, Feb. 1937, E. J. Kinney.

"Twenty-second Annual Report University of Maryland Extension Service for the Year 1936," Agr. Ext. Serv., College Park, Md., T. B. Symons, Director.

"Sweet Potato Certification," Agr. Ext. Serv., College Park, Md., Cir. 122, Aug. 1937, R. A. Jeble.

"Growing Triumph Sweet Potatoes for Starch Manufacture," Agr. Exp. Sta., State College, Miss., Inform. Sheet 120, May 1937, W. S. Anderson.

"The Effect of Winter Storage on the Palatability and Vitamin Content of Potatoes Grown in Montana," Agr. Exp. Sta., Bozeman, Mont., Bul. 346, Sept. 1937, Helen L. Mayfield, Jessie E. Richardson, Ruth J. Davis, and Erlene J. Andes.

"Rape," Agr. Ext. Serv., Corvallis, Orez., Ext. Bul. 499, Feb. 1937, G. R. Hyslop and H. A. Schoth.

"Strawberry Varieties in Southwest Texas," Agr. Exp. Sta., College Station, Brazos County, Tex., Bul. 556, Oct. 1937, E. Mortensen.

"Sorghums Varietal Tests in Utah," Agr. Exp. Sta., Logan, Utah, Bul 281, July 1937, R. W. Woodward, D. C. Tingey, and R. J. Evans.

"Spring Wheat Production and Varieties for Wyoming," Agr. Exp. Sta., Laramie, Wyo., Bul. 224, Oct. 1937, Glen Hartman.

"The Response of Government to Agriculture," U. S. D. A., Washington, D. C., Nov. 1937, Arthur P. Chew.

"Planting and Care of Shelterbelts on the Northern Great Plains," U. S. D. A., Washington, D. C., Farmers' Bul. 1603, Revised Aug. 1937, Robert Wilson and Ernest J. George.

"Report of the Chief of the Office of Experiment Stations, 1937," U. S. D. A., Washington, D. C., Sept. 15, 1937, James T. Jardine.

Economics

¶ Of special interest to all those interested in American agriculture is the U. S. D. A. Miscellaneous Publication No. 266, "A Graphic Summary of the Number, Size, and Type of Farm, and Value of Products," by O. E. Baker, Bureau of Agricultural Economics. The compilation is based largely on the census of agriculture for 1930 and 1935. It is the last volume of a series prepared under the direction of Dr. Baker and brings up to date the Graphic Summary of American Agriculture published in 1931 as Miscellaneous Publication 105. The first of the series appeared in 1915, and the second in 1921.

In addition to the many interesting graphic maps, the author comments on the changes that have occurred in American agriculture and offers some suggestion as to why they have taken

place. For 20 years preceding 1930 the trend in number of farms was downward. The economic depression seems temporarily at least, to have reversed that trend. Prior to the depression the rapid progress made in agricultural technique stimulated the production of more efficient types of livestock, that is, livestock that is more efficient in the utilization of feeds, such as dairy cows, hogs, and poultry. The less efficient types, sheep and beef cattle, remained about stationary or declined in numbers. Largely responsible for this increase in the number of the more efficient types was the releasing of about 30,000,000 acres of crop land for the production of marketable livestock which had previously been devoted to the production of feed for horses and mules which have been replaced by the tractor and other forms of power machinery.

The trend at the same time was from the less productive toward the more productive crops per acre, principally from corn toward cotton, from wheat toward corn along the northwestern margin of the corn belt, and in other sections from grain and hay toward fruit and vegetables, particularly in such areas as California.

In addition to these, other efficiency measures that have been instigated were the improvements in feeding practices and methods of producing livestock which resulted in increased production of animal products per unit of feed consumed. Largely because of these factors agricultural production registered approximately an 18 per cent increase between the period 1915-20 and 1925-30. This increase was more rapid than the increase in population.

The factor which largely contributed to the reduction in number of farms in the eastern half of the United States was the relative prosperity of the cities and the high wages available prior to the depression. With the depression, however, lack of work as well as the extremely low wage rate which prevailed in some sections resulted in migration of unemployed people to farm land. At the time of the census of 1935 it was estimated that about 2,000,000 of the "back-to-the-land people" were still living on farms. In addition to the number who migrated from the cities to the farms were a large number of young potential employes who were backed up on the farms due to their inability to secure work in the city. The recent improvement in urban conditions has again stimulated the migration of farm youth to the cities, and in 1934 and 1935 the net movement apparently exceeded about half the predepression magnitude and undoubtedly the movement in 1936 and 1937 is larger than in 1935. It may now be possible that the number of farms has again reached a stationary condition, but at a new and higher level.

During the period of the depression and the migration to the farms, approximately an increase of 500,000 farms occurred. This increase took place largely in poor and hilly farming areas and near the large cities, particularly in the manufacturing areas of the Northeast. In contrast, there was a decrease in farms in the more highly commercialized cotton belt and practically no change in the richer corn belt. The effect of this movement of city people to the farm on per capita production was to decrease the output per worker and to cause a general lowering of the level of living.

An analysis of the distribution of wealth, size of farm, and production discloses that there still exists a rather wide range among farmers in the areas of land farmed and in wealth. In 1930 about 60 per cent of the farms were under 100 acres in size. But in this 60 per cent were included only 16 per cent of the total land in farms and less than 24 per cent of the crop land harvested and less than 29 per cent of the value of land and build-

ings. In contrast to this 20 per cent of all the farms were 174 acres or larger but in this 20 per cent were included 66 per cent of all the farm land, over 53 per cent of the crop land harvested, and over 47 per cent of the value of land and buildings. Another important point that must be considered in this connection is that of the farms under 100 acres in area about one-half were operated by tenants, whereas, a little over one-third of the farms exceeding 174 acres in area were farmed by tenants.

During the depression the number of small farms, that is, 3 to 9 acres, increased nearly 70 per cent and farms from 10 to 19 acres increased 22 per cent. The number of farms from 20 to 49 acres remained about stationary. Those in all the larger groups up to 1,000 acres increased roughly 5 per cent, and those larger than 1,000 acres about 10 per cent. Dr. Baker notes in this connection, "Apparently, the differences in area farmed, and probably in the wealth of farmers, was not diminished during the depression."

In commenting upon the value of farm products produced per farm in the United States, it is noted that about one-half of the farms in 1929 produced less than $1,000 worth of products, including those consumed by the farm family. "This less productive half of the farms produced only about 11 per cent of the products sold or traded to use the census phrase. Probably the more productive half of the farms in a few years could be brought to the point of producing this remaining 11 per cent if prices of farm products afforded encouragement. Half of the farms of the Nation are not needed to feed and clothe the non-farm people. But these less productive farms, measured in food and fibers, are contributing an increasing proportion of the citizens of the future, for the birth-rate of the people on these farms is high.

It is further noted that one-fourth of the farms of the Nation in 1929 produced an average of less than $600 worth of products. The typical peasant farm of northern Europe produces more than this—probably nearer $1,000 worth of products. Fifteen per cent of the farms, nearly 1,000,000, produced less than $400 worth of products. This is approaching the Chinese level of production. Less than 200,000 of these were part-time farms.

In contrast to the above figures, 19 per cent of the farms produced over $2,500 worth of products. This one-fifth of the farms produced over three-fifths of the products sold or traded. These better farms are located mostly in the dairy belt, the corn belt, the wheat regions, and the valleys of the far West, with a few in Texas and Oklahoma.

One of the best ways, from the reader's standpoint, to acquire a quick and comprehensive understanding of economic problems is through graphic presentation. It is because of this that the bulletin with its large number of maps and charts picturing the economic development of American agriculture is especially valuable. Each graph is accompanied by a paragraph of brief description and explanation.

¶ According to the latest report from the North Carolina Department of Agriculture at Raleigh, N. C., "Fertilizers Sold in North Carolina During the Period January 1, 1937 to June 30, 1937," fertilizer sales in the first half of 1937 amounted to 871,484 tons of mixed goods and 116,480 tons of nitrogenous materials, 53,820 tons of phosphatic materials, 25,400 tons of potassic materials, and 2,815 tons of customer's mixtures, or a total of 1,069,999 tons. For some time North Carolina has published their fertilizer statistics in this excellent form. In addition to the above-mentioned tonnages, the quality of each grade sold in the State is given. The 3-8-3 is still the dominating single analysis, representing 316,864 tons, which is followed by 3-8-5 with 199,378 tons.

Other important analyses include 5-7-5, 4-10-4, 4-12-4, 6-6-5, 2-10-6, 2-9-3, and 4-8-4. It is especially interesting to note the trend for higher analysis fertilizers in this State. In 1935 the leading grades were 3-8-3, 3-8-5, 4-8-4, and 5-7-5. In that year 3-8-3 represented 46.7 per cent of the total mixtures; 3-8-5 represented 18.7 per cent; 4-8-4, 6.3 per cent; and 5-7-5, 3.9 per cent. In the first half of 1937 3-8-3 represented only 26.3 per cent of the total tonnage of mixed goods, while 3-8-5 had increased to 23 per cent, 4-8-4 to 8.3 percent; and 5-7-5 to 5 per cent.

"Fertilizer and Fertilizer Material," Dept. of Agr. and Indus., Montgomery, Ala., Bul. 36, Fiscal Year 1936-37, Geo. H. Marsh.

"1936 Orange County Avocado Production Cost Analysis," (Seven-Year Summary 1930-1936), Agr. Ext. Serv., Berkeley, Calif.

"Extracts from the Agricultural Code of California, Pertaining to General Provisions and Fertilizing Materials," Div. V, Chap. 7, Art. 2 (Revised Aug. 27, 1937), St. Dept. of Agr., Sacramento, Calif.

"Commercial Fertilizers Report for 1937," Agr. Exp. Sta., New Haven, Conn., Bul. 404, Oct. 1937.

"Florida Citrus Prices, 1," Agr. Exp. Sta., Gainesville, Fla., Bul. 315, Sept. 1937, A. H. Spurlock and Marvin A. Brooker.

"Agricultural Outlook for Illinois 1938," Agr. Ext. Serv., Urbana, Ill., Cir. 480, Dec. 1, 1937.

"Illinois Farm Economics," Agr. Ext. Serv., Urbana, Ill., Nos. 30 and 31, Nov. and Dec. 1937.

"Indiana Crops and Livestock," Agr. Exp. Sta., West Lafayette, Ind., No. 146, Nov. 1, 1937.

"Marketing Potatoes in Michigan," Agr. Exp. Sta., East Lansing, Mich., Sp. Bul. 288, Nov. 1937, G. N. Motts.

"Minnesota Farm Business Notes. Farm Income in Minnesota," Agr. Ext. Serv., St. Paul, Minn., Mimeo. 180, Dec. 20, 1937, Warren C. Waite.

"Mississippi Type of Farming Areas," Coordinated with Type of Farming Areas of the United States 1935, Agr. Exp. Sta., State College, Miss.

"Present Uses of Land in Mississippi 1935," State Land Planning Specialist, State College, Miss., 1937.

"Problem Area Map and Supplementary Report," State Land Planning Specialist, State College, Miss., Aug. 31, 1936.

"Approximate Land Area of Minor Civil Divisions in Mississippi with Key State Map," State Land Planning Specialist, State College, Miss., Dec. 1, 1936.

"Assessment of Montana Farm Lands," Agr. Exp. Sta., Bozeman, Mont., Bul. 348, Oct. 1937, R. R. Renne and H. H. Lord.

"A Statistical Study of Agricultural and Related Trends in South Carolina," Agr. Exp. Sta., Clemson, S. C., Bul. 312, Oct. 1937, J. L. Fulmer.

"Biennial Report of the Department of Agriculture to the Governor, 1935-1936," O. E. Van Cleave, Com. of Agr., Nashville, Tenn.

"Statistics of Texas Agriculture," Agr. Exp. Sta., College Station, Brazos County, Tex., Cir. 80, Oct. 1937, L. P. Gabbard and C. A. Bonnen.

"Biennial Report, Department of Agriculture and Markets, 1935-1936," Wis. Dept. of Agr. and Markets, Madison, Wis., Bul. 178, Oct. 1936, Walter H. Ebling, E. Smith Kimball, W. D. Bormuth, and F. J. Graham.

"1937 Cotton Price Adjustment Payment Plan," U. S. D. A., AAA, Washington, D. C., CAP-102, Nov. 1, 1937.

"The Dairyman's Place in Farm Solidarity," U. S. D. A., AAA, Washington, D. C., G-79, Gen. Inf. Series, Nov. 1937.

"The Ever-normal Granary: What Can It Do for the Corn Belt and the Nation?" U. S. D. A., AAA, Washington, D. C., G-80 Gen. Inf. Series, Nov. 1937.

"A National Program for Wheat," U. S. D. A., AAA, Washington, D. C., G-81, Gen. Inf. Series, Dec. 1937.

"Determination of Fair and Reasonable Wage Rates for Harvesting of the 1937 Crop of Louisiana Sugarcane, Pursuant to the Sugar Act of 1937," U. S. D. A., AAA, Washington, D. C., S. D. No. 12, Nov. 12, 1937, H. A. Wallace, Sec. of Agr.

"Report of the Solicitor, 1937," U. S. D. A., Washington, D. C., Martin G. White, Solicitor.

Golfer (far off in the rough): "Say, caddy, why do you keep looking at your watch?"

Caddy: "This isn't a watch, sir, it's a compass."

"How's the wife, George?"

"Not so well, old boy. She's just had quinsy."

"Gosh! How many is that you've got now?"

Soil Treatment Effects

THE plant does more than merely store what it takes from the soil. It uses these soil supplies as a help in running its plant machinery, and in manufacturing the more complex nutritional compounds as carbohydrates, proteins, fats, and vitamins not taken from the soil but yet so essential as animal feeds.

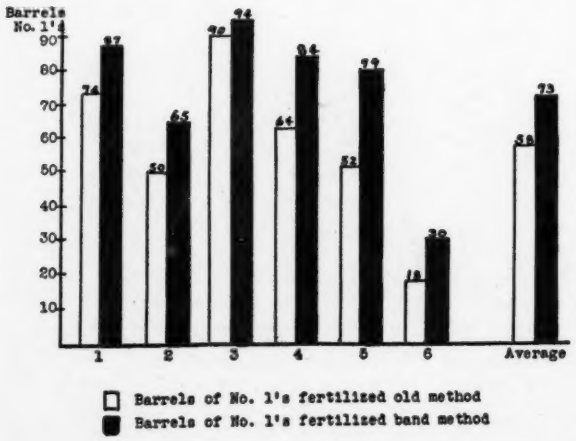
Lime treatment on soybeans doubled the harvest of protein per acre and almost doubled their content of this nutrient. To get a pound of protein a cow needed to eat but 7 pounds of hay from limed land, but was compelled to take 12 pounds for a pound of protein in hay grown on unlimed soil. When feeding on hay from limed soils, the cow was also taking more phosphorus, more potassium, and similar nutrient items. Carbohydrates are increased where young plants are grown on soil given soil treatments.

The plant factory more effectively uses the sunshine in manufacturing these complex substances when there are no deficiencies in the soil fertility. Young forage plants contain more energy, or heat, as shown by test, when lime for example is added to a lime-deficient soil. Not only protein and carbohydrate production by the plants, but even the plant's formation of the more elusive and less understood vitamins have been shown to be related to the soil fertility.

Soils deficient in potash are less effective in producing feeds rich in carotin, the forerunner of vitamin A. A complete fertilizer on wheat has increased the vitamin B content in the grain. All this indicates that the crop may be a defective feed on soils of low fertility but is improved in its feeding value when the soil is treated to correct these fertility deficiencies.

Fertilizer Placement Influences Profit

(*From page* 22)



growers of a varied number of crops. The growers' interest has naturally aroused the concern of quite a few farm implement manufacturers. As a result of this interest there are today a number of machines on the market which permit definite control of the placement of the fertilizer in reference to the seed. Transplanting machines are also being equipped so that the fertilizer can be placed to the side

of the plant and not directly under the plant, as has been the custom. In quite a few cases these machines are constructed to provide for planting the seed and distributing the fertilizer at one operation. In this type of operation a more definite control of the placement can be obtained.

Ben Barber Shaves Cow Costs

(*From page* 20)

During the drought he set up truck routes to get wet malt from local breweries out to his patrons. He found bakers throwing out a couple of tons of rye bread (flatbrod) daily, and this he seized and had taken to some of his membership at a very low hauling charge. Lately he experimented in the keeping of wet brewers' grains in silos and found it successful. He writes plenty of pieces for the Duluth paper about Ole Olson's oats and Olaf Anderson's alfalfa, and how it grew that way.

Meanwhile the demand for his services exceeds his individual capacity, hard worker though he is. One way he hopes to double his capacity is to finish the new house trailer which he has designed, in which he will carry a light steam boiler and a steam-driven Babcock outfit.

A Day's Work

Take one of his typical testing days. He arrives at John Johnson's farm about noon. He leaves John sample bottles for all his cows, a duplicate for checking, and one more for the separator. Driving on down the road he leaves similar sets of bottles at half a dozen farms and doubles back another way and takes in as many more. Back at the Johnson farm he helps milk the herd, or does it all perhaps in a labor emergency. He dehorns a calf or two, castrates a pig maybe, uses the clippers on some hairy heifers that want "barbering." In the morning he gathers up the samples (which the dairymen take themselves after the first two or three lessons) and notes the milk weights. He runs the tests and records them on duplicate barn sheets, mailing one to the customer, keeping one to record in his herd book—which is sent out later. Suggestions go out with the barn sheets and herd books. In some cases in this pioneer area he is obliged to furnish a milk scale, so he keeps a stock on hand for lending a day at a time when needed. These trips are made bi-monthly or six times a year over his territory. The herd books are all sealed because the service is private.

Barber often finds errors open to correction in tests made at local dairy plants by comparison of his own figures with the regular remittances coming to members. With perhaps one lone exception, the plants have gladly made restitution. In this case of refusal by the creamery owner, Barber called a mass meeting at the school house and invited several former patrons of the plant and a few competing plant managers to attend. He had already arranged to get a truck route going toward a neighboring creamery noted for its fair treatment of patrons. The upshot naturally is that the offending creamery withdrew its opposition and came across in handsome style with fairer test weights. This stunt may not have been a pretty one to pull, but it was decidedly practical and earned him respect as a fighter for farmers' rights.

One other idea of his is excellent. He has rented a farm with a big barn on it, planning to establish there what he calls a "calf orphanage." It is intended to set up an exchange service for men with scrub herds in need of new young replacements of pure-bred stock. Heifer calves from the larger

dairy farms supplying Duluth with fluid milk will be a source of excellent foundation stock, and they will go to this orphanage and later be taken out to the places that ask for them.

Barber does not bother with bull rings as this is well handled by the county agents. There are more than 50 bulls in rings in Itasca county alone. He sticks to individual herd matters and personal sales at small cash commissions. During the months of September and October 1937, Barber sold about $4,000 worth of cattle for his members to other members.

Without nosey interference with college or State extension activity, and cooperating fully with the official agricultural agencies, Ben Barber has made a secure place for himself and looks ahead to a model farm of his own where he will install a laboratory and become a permanent fixture in the development of mixed farming in one of the most promising regions of the Lake States.

Commercial Fertilizers in Grape Growing

(*From page* 14)

potassium plats, while the fruit from the check was a poor third. In several years of the experiment it was noted that earlier leaf ripening occurred on the vines of the phosphorus-potassium fertilized. No element has seemingly affected the sugar content, nor has any of the three affected cold resistance pro or con. In some seasons as the period of fruit maturity approaches, the grape berries fall from the stem. This in the parlance of the grower is known as "shelling." There has existed for many years back the idea that certain plant-food elements could check this trouble. Neither in this experiment, nor in an earlier one which was devoted entirely to the control of "shelling," did any of the fertilizers have any influence.

An examination of the data from this experiment shows that less cane or wood has been pruned away from the vines in the check plat than from any of the others, while at the same time fewer canes were put up each year for fruiting purposes. There can be but one explanation, less cane and leaf growth was made on the check vines. The vines fertilized with phosphorus and potassium have grown more cane and hence had more pruned away than the check vines. Throughout the life of this experiment all nitrogen fertilized plats yielded the greatest amount of cane.

A statistical analysis of the 24-year averages by pairs shows all treatments significantly higher than the check. Nitrogen in all cases gave significant results, as did potassium, but with the latter the significance was somewhat less than for the treatments containing nitrogen. It is also shown that lime depressed cane yields. Thus the data clearly indicate that nitrogen has been the most important material in producing greater amounts of cane and leaf in this vineyard, and that potassium has contributed materially, while phosphorus has been of doubtful value.

When the yields are considered in connection with the costs of obtaining the increases for the 25-year period — that is, cost of fertilizer deducted from the actual sales of the increased fruit production each year — it is noted that the plats receiving nitrogen have returned a larger profit than the phosphorus-potassium plats and a considerably greater money return over that of the unfertilized check. The net gain in money received from the vines subjected to the phosphorus-potassium treatment as

compared with the amount received for the fruit from the check was quite substantial. Nitrogen in combination with potassium has been worth considerably more than nitrogen used with phosphorus. In fact the greatest financial gains were realized from the nitrogen-potassium combination.

Probably the financial gains as a result of the use of fertilizers would not be so high, except for the fact that immediately following the adoption of the Eighteenth Amendment the selling prices for grapes were unusually high, and that these high prices continued for 3 or 4 years. At the same time yields were likewise high, and the increases in tonnages from the use of fertilizers were very marked.

Financial Gain

It should be kept in mind, however, that the costs of fertilizers were likewise high and continued so for some time after the selling prices for grapes declined. For the last 10 years of this experiment, the greatest financial gain has come from the use of nitrogen, phosphorus, and potassium in combination, but the increase was only $18.49 greater than that realized from the nitrogen-potassium treatment or a gain of $1.85 for each of the 10 years. This small gain is not sufficient to pay the cost of the 300 lbs. of superphosphate which were used in the combination.

Since nitrogen in the quickly available form of nitrate of soda consistently gave substantial gains of fruit and cane and larger money returns than other fertilizer elements, any vineyard fertilizer program on this soil type should include nitrate of soda, or possibly some other nitrogen carrier of equal availability. The data suggest that at least 250 lbs. of nitrate can be applied profitably. This amount carries approximately 39 lbs. of actual nitrogen.

Potassium seems to have been the next most important element, and possibly the effectiveness of the nitrate of soda has been in part due to the combination of potassium with it. Perhaps larger quantities of both nitrate of soda and muriate of potash would have given a greater money return.

Phosphorus applied annually in the form of superphosphate at the rate of 300 lbs. per acre seems of doubtful value, but since it has been noted that this element materially benefits the green manure crops, it would seem good practice to make an application in this amount at intervals of 2 or 3 years.

Commercial fertilizers cannot be used profitably with grapes if the soil is poorly drained. Diseases or insects that injure or destroy the foliage must be controlled in order to secure the greatest effectiveness from the use of fertilizers.

Peanuts Win Their Sit-down Strike

(*From page* 18)

which would leave a deficit of 56 lbs. in order to make the income balance with the outgo. The use of 500 to 600 lbs. of 0-10-10 per acre on peanuts is necessary to balance the removal of nutrients by the crops grown in the rotation, with the income.

On many soils additional fertilizer must be used to take care of that lost through leaching, and as a general rule it will pay best if used on the legume cover crop. The above program of fertilization may appear to be extravagant, but the crops must have nutrients in order to produce large

yields, and when the soil does not contain a sufficient quantity of nutrients, they must be added if economical yields are expected.

The soil is the farmer's bank account; and, as a general rule, when we check out more than we deposit, a "No Funds" slip will be used by the bank. The soil uses the method of returning low yields to indicate the account is low, but many who are receiving this notice do not recognize it as a call for another deposit. Then, too, it must be realized that all of the phosphorus and potash that is added to the soil is not available to plants because some of it is placed in the "lock box" and is not given up fast enough to supply the needs of the plant.

peanuts is considered to be around $30 per acre, the use of 40 lbs. of K_2O reduced the cost of producing the peanuts from 3.2 cents to about 2 cents per pound.

Taking a look into the future, if it costs 3.2 cents per pound to produce peanuts, there will be very little margin of profit between 3.2 cents per pound and the future selling price. This conclusion is arrived at from the present situation of thousands of acres of land in the Southern States that are well adapted to producing peanuts, which will be used for that purpose when the price of peanuts gets too far out of line with the price of cotton. In other words, the peanut grower must use all methods possible to reduce the cost of producing peanuts be-

TABLE IV. Balance Sheet for Plant Nutrients.

Crop	Removed by Crops			Returned by Crop Residue		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Cotton	39.5	15.6	15	0	0	0
Clover	67.8	13.8	66.9	40.7	8.2	40.1
Corn	83.0	36.7	64.2	41.5	18.3	32.1
Soybeans	42.5	10.0	17.6	21.2	5.0	8.8
Peanuts	80.7	16.2	48.5	15.5	3.0	15.2
Total Removed..	313.5	92.3	212.2			
Total Recovered.....				118.9	34.5	96.2
Excess of outgo over income.....				194.6	57.8	116.0

The best proof as to the soundness of the practice of using fertilizer on peanuts is to ask the crop through field tests and experiments, and if the peanut will pay for the fertilizer used and leave a net profit to the grower, its use will be practical and economical.

The results of an experiment at the Virginia Agricultural Experiment Station, located at Holland, Va., show that the use of 40 lbs. of K_2O per acre on peanuts gave an increase of 630 lbs. of peanuts per acre. At 3½ cents per pound for peanuts, the gross increase would be $21.05 or a net increase of about $18.50 per acre for the use of 40 lbs. of K_2O. In the above experiment the yield was increased from 920 to 1,450 lbs. per acre. When the cost of producing

low 3 cents per pound, if he expects to have very much profit on the production of peanuts. The results of the above experiment point the way to a lower cost of production, and the grower who follows the direction to which the above experiment is pointing will be far better off in the future than the one who ignores it.

The results of a demonstration in 1936 in Isle of Wight County on a Norfolk sandy loam soil that tested very poor in available potash by the Hester method was very convincing as to the potash needs of the peanut and the value of rapid soil testing in indicating deficiencies of potash. The results are given in Table V.

As a general rule it is desirable to have results over a period of at least 5 years before drawing any conclu-

sions, but, as stated in the beginning of this article, the peanut was considered as a scavenger for many years, and long-time results on heavy fertilization of peanuts are not available. The above results for 1 year may be used to get at least some idea as to the response that may be expected from the use of potash on peanuts when grown on soils very poor in potash.

The field, in which the demonstration was conducted, had been cropped for several years without the addition of sufficient fertilizers to the crops grown in the rotation, which is a typical example of the practice followed on the majority of the peanut farms. The information in Table IV shows that where no fertilizers are used in the rotation, the outgo exceeds the income by 116 lbs. of K_2O, when all possible means of conserving the nutrients are used.

TABLE V. Fertilizer Demonstration in Isle of Wight County—1936

Fertilizer Treatment	Yield per Acre	Increase	Net Value of Increase Due to Potash
500 lbs. 0-12-6	1,338		
500 lbs. 0-12-6 200 lbs. muriate of potash	2,005	667	$20.15
500 lbs. 0-12-12	2,110	772	26.27
500 lbs. 0-12-12 200 lbs. muriate of potash	2,813	1,475	47.68

Response to Potash

The peanut responded when the practical test was applied to the theoretical needs and gave response up to 160 lbs. of K_2O. This difference could be easily accounted for by the failure to return all of the residue to this field or by the losses through leaching that were not taken into consideration in that table. The main point to be considered from an economical farm-management standpoint is not how large a yield was produced, but did the addition of potash yield a net profit to the grower. The use of 200 lbs. of muriate of potash broadcast on the soil about 2 weeks before planting and 500 lbs. of 0-12-12 applied on top of the row when the peanuts were cracking the ground increased the yield from 1,338 lbs., where 500 lbs. of 0-12-6 were used, to 2,813 lbs. per acre, or an increase of 1,475 lbs. of peanuts per acre due to potash. The peanuts were sold for 3½ cents per pound, which meant a net increase of $47.68 per acre.

The information in Table VI gives the results of a demonstration conducted on a farm where practically the same crops are grown as given in Table IV, where lespedeza is substituted for the majority of the cotton. The fertilizers used consist of 300 to 350 lbs. of 2-12-4 per acre on corn, 600 lbs. of 4-8-6 per acre on cotton, and 300 lbs. of 0-12-5 per acre on clover, and in 1937, 500 lbs. of 0-10-10 were applied to the peanut crop. The potash test of the soil was fair.

The results of this demonstration are used for two reasons. First, to show that even where the proper fertilizers are used on the other crops in the rotation and the soil is far above the average in fertility and productivity, as indicated by the high yield of 2,288 lbs. of peanuts per acre on the check which is over twice the average yield, the peanuts responded to an application of 60 lbs. of K_2O and gave a net value of $4.53 per acre for the K_2O applied. Second, the soil test indicated in the beginning that very little response could be expected; and when the limit was approached, the yield was actually decreased. In other words, there is a limit to the use

of fertilizers and lime; and unless good judgment is used, they may be of more harm than value.

There were over 500 soil tests made in Isle of Wight during 1935 and 1936, and approximately 85 per cent of these tests showed the potash content to be below fair, leaving only 15 per cent that tested fair or better. Fertilizer recommendations were made on the basis of the tests, and the best indication of the results obtained from the use of an 0-10-10, which was the recommendation on soils testing poor in potash, is the fact that the tonnage of 0-10-10 sold in the county has steadily increased, and the better farmers in that area have adopted that analysis as a regular practice. The indications of potash deficiency in the cotton and corn crops throughout the peanut belt will be found on the majority of the farms that have not been following a well-rounded fertilizer program, which would be further evidence of the general potash deficiency of soils in the peanut belt.

TABLE VI. Fertilizer Demonstration in Isle of Wight County—1936

Fertilizer Treatment	Yield per Acre	Increase	Net Value of Increase Due to Potash
500 lbs. 0-12-6	2,288		
500 lbs. 0-12-6 200 lbs. muriate of potash	2,332	44	—$1.44
500 lbs. 0-12-12	2,420	132	4.53
500 lbs. 0-12-12 200 lbs. muriate of potash	2,112	—176	—10.99

Maintain Balance

It is not meant to convey the idea that potash is the only element needed in peanut production, as lime that carries calcium and magnesium, phosphorus, and organic matter are essential, and unless there is a balance between all of these elements in the soil, maximum response cannot be expected. The decrease in yield of peanuts shown in Table VI could be due to the excess of potash as compared to phosphorus or some other element. The use of potash in the peanut belt has not received the attention that it is due because, as shown in Table IV, the excess of the outgo of potash over the income is 116 lbs. per acre, as compared to 56.8 lbs. for phosphorus. Then too, there is very little phosphorus lost through leaching, while the potash loss is very high. Due to the above reasons, it would appear that in order to make the nutrient sheet balance, the ratio of phosphorus to potash should be about equal for peanuts. The results of tests on the farm justify this conclusion, as well as the balance sheet in Table IV.

When we consider that on the average peanut farm small quantities of fertilizer are used when compared to the loss through crop removal, the low plant-nutrient content of the soils, the loose and open nature of the soils, a farming system that includes a relatively low number of animal units per acre for proper use of the crop residue, and, in general, the use of a soil-depleting system of agriculture, the following program must be adopted and strictly followed if the yields per acre of peanuts and other crops are expected to be maintained at a profitable level. This program applies not only to producers of crops. In my opinion the future of the whole South depends upon the general recognition of the need and the adoption of a sound and economical soil-building program.

1. The use of sufficient lime to correct the undesirable conditions associated with soil acidity and to provide the necessary calcium and magnesium. The exact amount needed

will be determined by the State Agricultural Colleges.

2. A systematic crop rotation that includes at least one legume as a green manure crop in order to balance the removal of nutrients, add nitrogen to the soil, and maintain the organic matter.

3. A program of "No bare acres by Christmas" to reduce the loss of nutrients by leaching and to provide winter grazing for livestock.

4. If peanuts are grown on light sandy soils, on which legumes have not been grown, the use of about 2 per cent N in the fertilizer or 500 to 600 lbs. of 2-8-10 fertilizer per acre. On soils where a proper rotation that includes at least one legume as a green manure crop has been used, the application of 500 to 600 lbs. of 0-10-10 per acre will be sufficient. The fertilizer should be used on top of the row when the peanuts begin to crack the ground, in order to prevent germination injury.

5. The wise use of fertilizers in sufficient quantities to more nearly balance the income of plant nutrients with the removal by all crops grown in the rotation and lost through leaching.

6. A general recognition that legumes remove large quantities of potash and phosphorus, and that in order to make a legume program effective, liberal applications of potash and phosphorus must be made.

7. A larger number of animal units per acre to make economical use of crop residue and provide an additional source of income.

8. A recognition by the business and professional men that a soil fertility program is just as essential to their future happiness as it is to the farmer.

In conclusion, if the evidence presented in this case is not sufficient to convince you of the fertilizer needs of the peanut or the soundness of the fertility program, you may take the evidence and the program to the crop and soil which is the highest court of judgment on a subject of this kind, and I feel sure they will stand the test and the original decision will be upheld.

Raising Pure-bred Seed for the South

(*From page* 11)

nition and propagation of animal variations bear to the production of livestock. There are thousands of experts all over the world engaged in the business of testing animals and propagating from those of proved quality, whereas there are only a few men engaged in the work of testing plants and propagating those of proved superiority, although plant products are of far greater value than animal products.

The plant breeder takes advantage of the well-known fact that all nature is variable, discovers which of these variations in plants are most valuable, and propagates these for distribution. When a pure-bred strain of superior quality and yield is discovered, increased, and distributed by the plant breeder, nature (and usually the farmer himself at thresher or gin) begins at once to destroy its uniformity and value. Within a few years natural variation, crossing, mixing, or all three, result in the destruction or lowering of the uniformity and money-producing value of the new strain. So it is necessary for the plant breeder to continue his operations indefinitely, not only to discover new and better variations, but to maintain the uniformity and character of all varieties which he has heretofore bred and distributed.

From the above it is clear that if

the practical farmer wishes to profit continuously by the work of the scientific breeder, it is necessary for him constantly to renew his seed stocks.

Now the real plant breeder is not a seedsman in the ordinary sense; he is not primarily a distributor of seeds but a creator of new types and varieties which may be of incalculable value to agriculture. But the really scientific plant breeder, operating on a large scale, must sell his comparatively small outturn at high prices as compared with ordinary seed.

A Plan Pays Profit

However, the value of these superior creations of the breeder can be reflected into profits to the farmer at extremely small cost, as suggested by one agricultural worker, after the following plan:

The farmer who grows 100 acres of cotton can secure the services of the best plant-breeding talent at a cost averaging not more than 10c or 15c per acre.

He will need, say, 100 bushels of seed per year with some reserve for replanting. Pedigreed seed from the very best scientific sources are usually sold at $3 to $3.50 per bushel. Suppose the farmer places an order each year with his plant breeder for 6 bushels of cotton seed costing, say, $15. Planted on 6 acres of well-fertilized land with a drop seed planter, he should produce not less than 120 bushels of seed. Charging the extra cost of the scientifically bred seed over ordinary seed to this 120 bushels, will add 10c per bushel to their cost and this will add but 10c per acre to the cost of his next crop. If the new strain or variety is in any respect superior to the strain or variety formerly planted (and the difference in its money value will generally be from $5 to $20 an acre) the resulting gain will be almost without cost.

Since cotton is the South's main money crop, and since the best opportunity of the cotton grower to make a good profit is in producing a lint of superior length and quality, Coker's Pedigreed Seed Company began in its early days to develop "staple" cotton varieties. And with the successful development of these superior lints arose the problem of a market where the farmer could secure the premium prices justified by the length and quality of his lint.

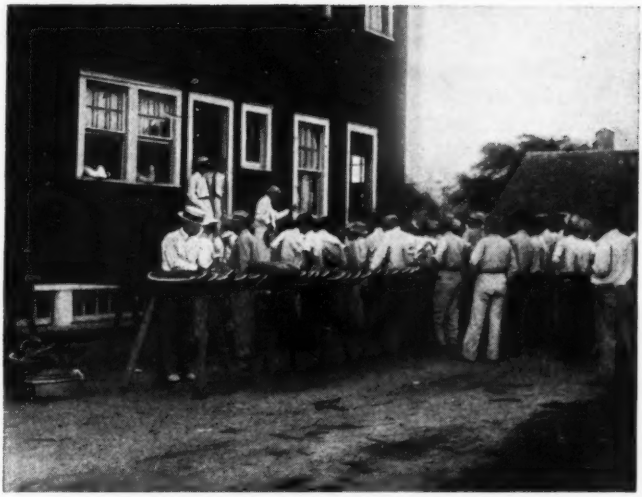
So it was that in 1918 David Coker and his colleagues organized the Coker Cotton Company with ample capital and facilities to handle for farmers the long staples. It has now the largest staple organization in the Carolinas. How the Coker Cotton Company and its representatives in England and America, with the aid of some enlightened spinners, overcame the difficulties in establishing a long-staple market cannot be told here, but let it be sufficient to say that the Coker Cotton Company and Coker's Pedigreed Company have jointly rendered a great service to the cotton manufacturing industry, as well as to the cotton farmer. Mills can now easily secure uniformly and accurately classed long-staple lints, and the grower can sell these lints at equitable premiums.

Just a brief enumeration of some "pedigreed" results. It is of course not possible to discuss in detail these results and their economic values.

1. Cottons that make greater yields and longer staple. A half dozen years ago most Southern cotton mills were using mostly 15/16-inch to 1 1/32-inch cotton. Recently many mills are using 1 1/16- to 1⅛-inch cotton, and the demand for these lengths is increasing, with higher premiums over prices of shorter cottons.

2. A bright tobacco, the Gold Dollar variety, that has already brought immensely greater profits to the growers, over $400 per acre to many farmers.

3. Smut-immune and highly cold-resistant oats that make high yields and have very high feeding value.



Serving Coker watermelons to a group of visitors at the farm.

4. A wheat which will make heavy yields from Piedmont to Tidewater, so that the Southeastern farmer may grow his own bread to advantage.

5. Wilt-resistant varieties of cotton that are helping to avoid losses of millions of dollars on wilt-infected lands.

6. Improved varieties of soybeans, some bred especially for seed and others especially for hay, to meet Southern needs and conditions.

Hartsville, South Carolina, is a Mecca for practical farmers of the Southeast who want to learn the value of purebred seeds and intelligent practices; for scientists far and wide who want to study the plant-breeding technique of Coker; for cotton buyers representing American and foreign mills who want to find the staples they need.

Scientific agriculturists from practically every foreign country in which cotton is grown have visited Hartsville, and officials and specialists from the United States Department of Agriculture are not infrequent visitors. But the real missionary work that Coker is doing is among the small farmers and croppers who must be convinced by actual demonstration of the practical value of scientific plant breeding and cultural practices. That is why county agricultural agents and other agricultural leaders of South Carolina and other States have been prompt to recognize the Pedigreed Seed Company as a free educational institution of great value to the average farmer, bringing annually thousands of these farmers to Hartsville on "see and learn tours."

In 1937, Plant Breeder Wilds estimates between 6,000 and 7,000 visitors were welcomed at the Pedigreed Seed Company's plant-breeding and demonstration farms. The "welcome" is genuine Southern style hospitality, and always includes in season a feast of Coker-bred watermelons, many acres of which are grown annually for this purpose.

Value of Demonstration

"There is no way of teaching agriculture as well as by demonstration," says Mr. Coker. That is why he endorses and supports so actively the work of the agricultural extension services, why he and his organization welcome to Hartsville all who will come, and why he operates large farms on which he practices what he preaches about better soils, better seed, better fertilization, better cultivation.

The extent of the plant-breeding work itself may be judged by the fact that for cotton breeding there are 70 acres in plant-to-row and variety tests, 150 acres in first-year increase, and 279 acres in second-year increase; for small grain 14 acres in head-to-row and variety tests, 30 acres in

first-year increase, and 28 acres in second-year increase.

Even more extensive and impressive are the Coker general farming operations on which are demonstrated the intelligent application of scientific principles.

About one-third of the cultivated acreage is planted yearly to cotton. In 1937 the 1,534 acres in cotton averaged 509 pounds of lint per acre; in 1936, even better, 526 pounds. In addition to this acreage on Coker lands, the company had grown under direct control 3,500 acres of cotton for seed, all ginned at the company's gins and handled just as its own crops are handled.

The balance of the Coker acreage is devoted to other crops, mostly under a system of rotation; corn interplanted with peas the first year, small grain followed with peas or soybeans the second year, cotton the third year.

Care of Cotton

Mr. Coker insists on the practice of a cover crop on cotton land, as being important for yield and quality of cotton. Cover crops mean humus, humus means moisture-holding ability, and moisture affects favorably both pounds per acre and length and quality of staple.

Scientific fertilization, that is, intelligent use of chemical fertilizers according to plant-food needs of the soils involved, marks the Pedigreed Seed Company's practice and serves as instructive demonstration to the visiting public. Says George Wilds on this point:

"The chemical requirements of our various soils are so different that a general statement covering all is difficult to make. We find all three major elements very essential. The big problem is to properly balance the fertilizers. We have always used sufficient acid phosphate and ammonia but found out through tests that we were not using sufficient potash. Since 1923 we have increased the use of potash with very beneficial results. On our general farms we use from 25 to 75 units of K_2O per acre, varying with the soil requirements."

Potash, he finds, as do other good farmers, has several specific benefits: it gives greater vigor and vitality to plants, thus increasing yields; it increases the plants' fruit-holding ability; it prevents rust; it aids in boll development and makes picking easier.

The Coker practice in fertilizing cotton carries special value to cotton growers whose lands are sandy loams. On their lands, which are principally Norfolk and Marlboro loams, the usual cotton fertilizer is 500 pounds per acre of a mixture carrying 10 to 12 per cent phosphoric acid, 4 per cent ammonia, and 3 to 4 per cent potash. A side-dressing with 100 pounds each of potash and ammonia is made in two applications.

Coker's Pedigreed Seed Company is an organization now regarded by many agricultural scientists, educators, farm leaders, and practical farmers as an educational institution which is contributing very materially to the knowledge and economic benefit of the South.

"The work of the Cokers at Hartsville has been of inestimable value to the agriculture of South Carolina and other Southeastern States. They have given to agriculture better varieties of cotton, corn, grain, and tobacco each year through extensive and systematic plant breeding. So established in the confidence of the people have become these seeds, that farmers who have seed for sale usually measure their value as being 'so many years from Coker.' "—J. M. Eleazer, manager, Ashwood Resettlement Project, South Carolina.

"The work done by Mr. Coker's organization has meant literally hundreds of thousands of dollars to the farmers of the South. There are a number of farmers in this county as well as throughout the South who make a practice of securing a small

amount of seed from Coker each year, which serves for a seed patch for their entire plantings the next year. I have heard many farmers say that they would buy one or more bushels of Coker's new strains of cotton seed regardless of the price he asked for them."—David R. Hopkins, Richland County (S. C.) farm agent.

"The general esteem in which Coker's Pedigreed Seed Company is held was aptly expressed by a man in my office recently when he said, 'I consider that Mr. Coker has done more for agriculture in the South than any other living man.' "—W. J. Tiller, Chesterfield County (S. C.) farm agent.

"David R. Coker is South Carolina's greatest farmer. He has made money at it himself and has added several millions a year to the aggregate income of other Southeastern farmers." —James C. Derieux, in *Country Home Magazine*.

A sixth grade South Carolina school child, when asked in a test to name three essentials for good crops in South Carolina, wrote: "Good soil, good cultivation, and Coker's Pedigreed Seed Company."

And finally—

"There may be some difference of opinion about other nominations," says Dr. Clarence Poe, editor of *The Progressive Farmer-Southern Ruralist*, in nominating four Southern leaders for commendation on their service to agriculture, "but when it comes to David R. Coker, North Carolina and Virginia will be ready to join his home State in an unanimous Aye: (1) Because of his pioneer work in lengthening the staple of cotton lint and thereby increasing returns from the South's chief money crop. (2) Because of his equally far-reaching service in developing rust-resistant varieties of wheat and oats, thus helping our farmers to live at home. (3) Because of his fine example in subordinating the commercial spirit to the scientific spirit in an historic Southern seed-breeding enterprise."

Hunch Hunters

(*From page 6*)

loons, compasses, clocks, and water wheels, but right after Hargreave's spinning jenny was born and Watt's steam engine took life, we notice that the list of achievements grew tremendously. Men inspired each other to outdo past efforts, all catering to demand and in turn educating the masses to newer wants. Since the eighteenth century dawned, man has developed all of the following items, startling though it seems: For power generation and transmission—condensers, slide valves, shaft governors, water tube boilers, stokers, oil fuels, electric lights, storage batteries, steam turbines, and the Diesel engine. For production machinery—planing, boring, drilling and grinding equipment, precision tools, ball and roller bearings, and welding. In transportation—locomotives, air brakes, block signals, screw propellers, gyro-compass, stabilizer, cantilever and suspension bridges, electric elevators, automobiles, and airplanes. In communication—telegraph, telephone, television, linotype, radio, rotary press, typewriter, business calculators, photography, and motion pictures with sound. In agriculture—harvesters, combines, planters, tractors, milkers, and commercial fertilizers. In sanitation—water filters, plumbing, and sewage disposal. In materials — Bessemer converters, open-hearth steel, electric furnaces, alloys, vulcanizing, rayon, and plastics.

Can anyone scan even such a hasty and imperfect list and not bow in tribute to the rate of human progress

made possible through the genius and courage of the individual? Moreover, it also means liberty to work and freedom to plan unhampered by dogma; and an atmosphere of encouragement, not always evident but imminent.

AND to prove that talent was not engrossed only in mundane affairs of the factory, note how medical science has leaped ahead with plans to ease pain and prolong life. This past century has seen the successful ether surgery of William Thomas Green Morton and Doctor Long of Georgia, followed by laughing gas, chloroform, and procaine, and the twilight sleep of child bearing. It has also welcomed vitamins, insulin for diabetes, synthetic hypnotics, glandular preparations, and inoculation against tetanus and typhoid.

In celebration of the American patent system two years ago, a pageant was presented which attempted to reveal just a few of the newest scientific achievements. In seeing it the observers stood on the threshold of another realm in which the mind and persistence of man had again outrun his ability to equip consumers with needful buying power (through some social agreement not yet envisioned).

At any rate, what did they see? First, a method of substituting direct current for alternating current in long-distance transmission, using Thyratron tubes, to render short circuits harmless and to increase power effect at lower costs. Second, solar heat devices by Dr. Abbott, fresh from long research in the Southwest. Third, polaroid lenses to polarize light and eliminate headlight glare. Fourth, high frequency oscillations induced by Dr. Woods ultrasonic waves of "inaudible sound" for heat generation. Fifth, the electric image tube of the RCA, to catch visible reflections of beams not seen by the eye's ordinary range, as an aid to the microscope. Sixth, lignin from wood fibers to use in heating, road building, and adhesives. Seventh, a new chemical substance, "chloroprene," to make rubber resistant to heat and the action of gasoline. Lastly, tempered glass for safety uses, and spun glass in yarn and braid, for textiles, insulation and tape, fireproof and lasting.

But in these rushing times of manifold machine design and multiple power at the finger's ends, have we solved our ultimate riddle? Must the exceptional individual pause in his pace and wait for the world to catch up? Must we hide away the hosts of thrifty and economic devices that men have kept up their sleeves because of fear that their introduction will disrupt some established business?

There are no more physical frontiers in land and no more world empires to settle. Our job is to fix life so that we, who can communicate together so quickly and enjoy such common luxuries, have a better understanding and more mutual good will.

THE crown of destiny awaits some man or small fearless group of leaders who will get us out of the rut of precedent in our social and economic thinking. The key to the unlocked door must be found by a union of experience and imagination, of skill and sentiment.

We may not live to see any sweeping change, so that all those who want these marvels may get them in return for honest labor; but our confidence in the steadfast progress of man's mind tells us that our schools and our associations, our cults and our policies will gradually shift toward greater emphasis on distribution of universal benefits rather than on scarcity and profits. And don't let's wait for Congress to do it!

DOCTOR, QUICK!

An old negro, riding on a train, fell asleep with his mouth wide open. A mischievous drummer came along and, having a convenient capsule of quinine in his pocket, uncorked it and sifted the bitter dose into the old negro's mouth at the root of his tongue. Soon the darkey awoke and became much perturbed. He called for the conductor, and asked:

"Boss, is dere a doctor on dis here train?"

"I don't know," said the conductor; "are you sick?"

"Yas, suh; I sho' is sick."

"What is the matter with you?"

"I dunno, suh, but it tastes like I busted my gall."

WITH FINESSE

The young man was teasing the pretty girl for a kiss.

"Tell me," she demanded, looking straight into his eyes, "have you ever kissed a girl before?"

The young man hesitated for a moment, and admitted:

"I cannot tell you a lie; I have."

"All right," said the sweet young thing, presenting her lips. "I didn't want you to practice on me."

"Remember, my boy," said the elderly relative, "that wealth does not bring happiness."

"I don't expect it to," answered the young man. "I merely want it so that I may be able to choose the kind of misery that is most agreeable to me."

Teacher: "Spell straight."

Johnny (second grade) "S-t-r-a-i-g-h-t."

Teacher: "Correct. What does it mean?"

Johnny: "Without ginger ale."

The lady remarked: "Hobo, did you notice the pile of wood in the yard?"

"Yes'm, I seen it."

"You should mind your grammar. You mean you saw it."

"No'm. You saw me see it, but you ain't seen me saw it."

DAUGHTER DEAR

Mother: "Mary, where have you been until 3 a. m?"

Mary: "Walking, Mother."

Mother: "For goodness' sake!"

Mary: "Yes, Mother."

"Tom and Miss Cory were on the teeter-totter board when Miss Cory slipped off and her end flew up, resulting in an injury to his vertebrae."

Gal: "How do you like my new hat?"

Guy (absently): "Fine, but you have a run in one."

JUST DESERTS

"Well Mandy, I heard your no-account husband died and you had him cremated. Is that right?"

"Yasuh, tha's right, only he ain't no-account no moah, ah's got 'im workin' for me now."

"Why, how is that possible, Mandy; he's dead, isn't he?"

"Yasuh, he's dead all right, but ah's got his ashes in an hour-glass."

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